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NORTH CAROLINA NUTRITION SURVEY

PART ONE

NORTH CAROLINA STATE BOARD OF HEALTH

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July 19, 1971

The Honorable Robert W. Scott
Governor of North Carolina
State Capitol
Raleigh, North Carolina 27602

Dear Governor Scott:

It is both a pleasure and an honor to submit to you the report of the North Carolina Nutrition Survey, Part 1, carried out at your direction by the State Board of Health.

The success of this study was considerably enhanced by the support of a number of state, local and federal governmental agencies, as well as by the cooperation of the many North Carolina families included in the survey sample.

It is our hope that these findings, as well as those to be included in Part 2, will be useful in guiding sound nutrition program planning within our state.

Respectfully submitted,

Jacob Koomen

Jacob Koomen, M.D., M.P.H.
State Health Director

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REPORT
OF THE
NORTH CAROLINA NUTRITION SURVEY

PART I

NORTH CAROLINA STATE BOARD OF HEALTH

ACKNOWLEDGEMENTS

The State Board of Health commends those homemakers in all parts of North Carolina who took great care to answer the many survey questions with accuracy and with cheerfulness. Their helpfulness made the work of the interviewers and technicians a refreshing and challenging task.

The North Carolina Nutrition Survey Staff received considerable assistance from the National Nutrition Survey, a number of state agencies, faculty members of the University of North Carolina at Chapel Hill and of North Carolina State University at Raleigh, as well as consultants from the Research Triangle Institute.

The State Board of Health also wishes to acknowledge the long hours of work and the special skills contributed by many of its own staff who played a key role in planning and conducting the Survey and in analyzing and presenting the findings.

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CHAPTER I

INTRODUCTION

During the past decade, public awareness of the presence of hunger and malnutrition in the world's richest nation has resulted in increased demands for information on the extent, location, and causation of nutrition problems. Widely publicized reports of congressional committee hearings, field inquiries by various foundations, and several newspaper series have served to focus attention on malnutrition and associated health problems; however, there remains a surprising dearth of reliable information on the subject.

In North Carolina, the most extensive published nutritional studies are now twenty-five years old.(1-3) During the 1940's, Dr. D. L. Milam, was principal investigator in a series of studies to determine the nutritional status of the residents of Wayne, Chatham, Alamance, and Orange Counties. Seven-day food intake records, laboratory tests and physical examinations were employed and revealed low intakes of vitamin C, vitamin A, calcium, iron, riboflavin, and calories. Low weights and low hemoglobin levels were additionally observed.

More recently, Bryan and Anderson(4) studied eleven-year old rural children receiving services from the Crippled Children's Program of the State Board of Health. Seventy-three percent of the 164 children studied were found to have inadequate diets.

Shortly after taking office, Governor Robert W. Scott called for information describing the extent of malnutrition in North Carolina. It was felt that inferences drawn from nationwide studies could not be relied upon to provide an accurate documentation of the situation in North Carolina. There was additional evidence that studies such as the National Nutrition Survey (NNS)(5) had been carried out among select population subgroups rather than the general population.

Governor Scott's determination to document the nutrition status of North Carolina culminated in a request of Dr. Jacob Koomen, State Health Director, for the North Carolina State Board of Health to plan and conduct a statewide survey. The survey was initiated on February 1, 1970.

This report describes in detail the North Carolina Nutrition Survey and its findings.

CHAPTER II

SURVEY OBJECTIVES

Consistent with the directive of Governor Scott, and the need for accurate information regarding the extent, location and causation of malnutrition in this state, the design of the survey incorporated the following objectives:

1. To estimate the percent of North Carolinians with adequate and inadequate diets.
2. To relate the adequacy of diet among our citizens to:
    a. Economic status
    b. Nutrition knowledge of the homemaker
    c. Availability of basic food preparation facilities
    d. Education of the homemaker
    e. Participation by those eligible in special food programs.
3. To search for evidence of iron deficiency anemia and growth retardation among preschool children.

CHAPTER III

SURVEY DESIGN

A. Target Population

This survey was designed to provide a representative sample of the household population of North Carolina. A household consisted of all persons, without regard to relationship, living together with common housekeeping arrangements in a house, apartment, or other group of rooms which constituted a housing unit. Excluded from the target population and the sample were residents of group quarters, institutions, and temporary quarters; such as, hospitals, jails, hotels, military barracks, and vacation cottages.

B. Design Principles

Advanced statistical survey techniques were employed to draw the sample of households. Consulting survey statisticians from the Research Triangle Institute were called upon to assist in the survey design, to select the households to be interviewed, and to instruct the interviewers.

Every effort was made to give each household in the state an equal chance to be chosen for interview, and thus to assure a representative sample. This sample, consisting of two hundred household clusters, was randomly partitioned into four independent and equally probable subsamples of 50 clusters each, with the understanding that any combination of the four groups would be representative, albeit the more obtained the better the estimate in terms of sampling error.

Two of these four subsamples, viz. 100 clusters, ultimately constituted the survey population.

The 100 clusters were allocated to predetermined strata in numbers directly proportional to the number of occupied housing units as reported in the 1960 census. Simple random sampling of clusters within strata was performed in such a way that the sampling rate was fixed at 1/1200; that is, the sample is self-weighting. In 1960, such a scheme would have yielded an average of 10 households per cluster; in 1970 when the survey was conducted the yield was greater due to population growth, resulting ultimately in 1315 North Carolina households eligible for interview.

C. Stratification of Sample

The stratification, alluded to above, consisted of *a'priori* segmentation of the household population in North Carolina. The reasons for stratifying the population beforehand are:

a. to obtain estimates of characteristics for certain desirable subdivisions of the population, treating each subdivision as a population in its own right, e.g., the rural population.

b. to achieve gains in the precision of the estimates of characteristics of the whole population, by subdividing a heterogeneous population into subpopulations, each of which is internally homogeneous.

The strata formed consisted of nested groups. First, North Carolina was divided into three regions, the Eastern, Piedmont and Western regions (Figure 1). Second, within each region, the population was categorized in terms of six sizes of place, viz.:

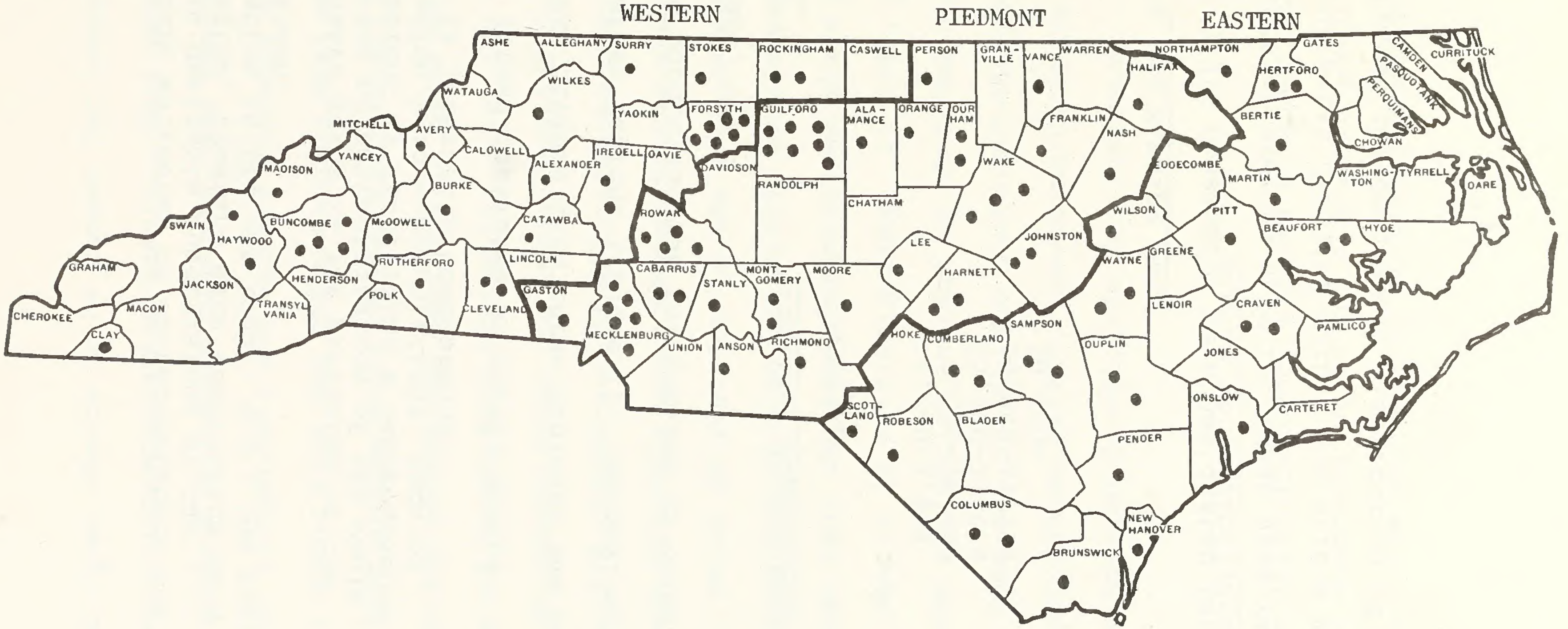
Place	Size(1960 Population)
Rural	<2,500
Urban	
1	2,500-4,999
2	5,000-14,999
3	15,000-29,999
4	30,000-49,999
5	50,000+

D. Nonresponse and Missing Data

A total of 1,315 households were designated for interview. In clusters of average size 13, these were randomly chosen throughout North Carolina within the strata mentioned. Figure 1 illustrates the geographic distribution of clusters

FIGURE 1

GEOGRAPHIC DISTRIBUTION OF CLUSTERS OF HOUSEHOLDS



sampled, although the placement of clusters within each county is not precisely depicted. Neither do these clusters represent occupied areas in every case. Of the 100 sampled, three were void of population (a shopping center, an access road, and a parking lot). This is not unexpected in area sampling and presents no problems in the estimation of desired quantities.

The nonresponse population consists of those households in which persons refused to be interviewed, were unable to answer, or were not at home after repeated call-backs. Of the 1,315 potential interviews, 14.6 percent fell in the nonresponse category. Characteristics of households in which response was obtained were attributed to those nonresponding households in a random manner within each cluster of neighboring households. The same adjustment was applied to another 14.2 percent of the potential interviews precluded by the sampling rule of performing no more than 20 interviews in each cluster. Assuming that interviewed households may adequately represent the neighboring households which were not interviewed, the adjustments performed do not alter the results.

Even when interviews were performed, some measurements were not always taken and some questions not always answered. Upon careful editing of the data collected, certain items were occasionally incomplete, unreliable, or contradictory. These errors and omissions comprise the missing data. The level of missing data is reported as the estimates are discussed.

CHAPTER IV

SURVEY PROCEDURES

A. Training and Quality Control

The field survey was conducted by the staff of the Nutrition Section of the State Board of Health with additional assistance from the nutritionist of the Mecklenburg County Health Department. Field technicians performed the anthropometric and hematologic measurements.

In order to assure uniformity in the quality of data collected, the interviewers and technicians took part in a week-long training program. National Nutrition Survey consultants provided comprehensive instruction on the use of food models. Details of these instructions are contained in "National Nutrition Survey Guidelines and Procedures" (1969). (6)

Practice sessions provided facility and skill in the execution of these procedures including the coding of food items. Instructions for completion of additional North Carolina Nutrition Survey questionnaires were also given during the training period as were instructions by Research Triangle Institute staff regarding the sampling procedures and rules applicable to the selection of households to be interviewed.

Another area of training involved interviewing techniques which served to enhance optimum response and to curtail non-sampling error, for example interviewer bias. Various professionals provided instruction in this area; situation dramas served to promote insight into the management of situations which might threaten termination of the interview.

Field technicians who performed anthropometric and hematologic measurements for preschool children were trained by the Laboratory Division of the State Board of Health.

In addition to these specific areas of training, public relations policies and methods for interim evaluation and continuing surveillance of procedures were developed during the pre-survey period. The Public Health Statistics Section coordinated the statistical aspects of the training.

B. Data Collection

Upon entering a county containing one or more sample household clusters, the interviewer visited the local health department and law enforcement agency, these agencies serving as sources of communication for persons inquiring about the survey. These were also of considerable assistance in the location of land segments containing the sample clusters.

The interviewer identified a sample household cluster using maps and demographic data furnished by the Research Triangle Institute. Any significant changes found by the interviewers in the composition of sample segments were referred to the Research Triangle Institute for further instructions.

Interviewers wore plastic badges showing the interviewer's name and photograph and identifying the interviewer as a member of the North Carolina Nutrition Survey Team. When contact was made with a household, the purpose of the survey and the selection of that particular household were explained to the homemaker or to the respondent - a person over 18 years of age who had responsibility for meal preparation.

The nutritionist-interviewer administered five questionnaires designed to collect the household data. Two additional schedules were completed for each child whose first birthday was on or before the date of the interview or whose sixth birthday was to occur after the day of interview. The latter forms were the dietary recall form and an authorization for skin puncture of the child. (See Appendix for facsimiles of all questionnaires).

Following the interview, the nutritionist coded forms as required and contacted a field technician whenever permission was obtained for the anthropometric and hematologic procedures for preschool children. Subsequently the field technician visited the home, obtained the medical history, the blood sample, and the required measurements.

Height and weight were taken without shoes. Height was measured as the child stood on a level surface with his back against the straight edge of the anthropometric stick and the cross-beam was lowered to touch his head. The height was then read from the metal tape and recorded in millimeters. Children stood or sat on portable balance scales to be weighed. Their weight was recorded as nude weight in grams by subtracting a factor representing weight of clothing.

Two blood samples were taken from each child. One of these was taken immediately to a local laboratory for hematocrit determination and the other was sent with accompanying forms to the State Board of Health Laboratory where the hemoglobin level and mean corpuscular hemoglobin concentration were determined. The anthropometry and blood work forms were then routed to the Nutrition Section for coding, editing, and processing.

Upon request of the respondent, results of the blood work were sent to the family physician or local health department for inclusion in the child's medical record.

C. Data Processing

Information recorded on the questionnaires was coded by the interviewers and manually edited in the Nutrition Section. The coded data were transcribed to punched cards and machine edited in the Public Health Statistics Section. These data were transferred to magnetic tape which the National

Nutrition Survey used to compute percents of dietary standards for households and for children. These data were returned to North Carolina for extensive cross tabulations of observed variables.

Data processing errors were minimized by extensive cross-checking controls. The final audit of reported results consisted of nearly 5,000 hand calculations of every quantity obtained from the interviews of 12 households and 11 preschool children. These hand calculations were performed by a team of nutritionists and biostatisticians utilizing the original interview folders as a data base. The hand results were compared to independently derived computer outputs for those same cases. After detection and correction of several systematic errors, agreement is now complete.

D. Pretest

Prior to the actual survey, questionnaires, interview techniques, and data processing procedures were tested on the basis of interviews conducted in a sample of households drawn for that purpose. Three clusters were selected by the Research Triangle Institute: one rural, one suburban and one inner-city. As a result of this pretest experience, minor corrections in the forms and procedures were made.

CHAPTER V

POPULATION CHARACTERISTICS

A. Census Comparisons

The North Carolina Nutrition Survey provides estimates of several demographic and socio-economic characteristics which are useful in differentiating households according to their nutrition status. Comparisons of these estimates to the census enumerations are particularly meaningful because the survey was conducted between January and June of 1970 and the census was conducted in April.

The regional, racial, and residential distributions of North Carolina households are shown in Table 1; North Carolina Nutrition Survey estimates are compared to the official 1970 census results and to the 1960 census figures.

In Table 2, the North Carolina Nutrition Survey estimate of the North Carolina household population and the 1970 census household population count are given for the entire state with percentage distribution by region. Although North Carolina Nutrition Survey estimates for both households and the household population are higher than the census enumerations, the average number of persons per household was almost the same. The North Carolina Nutrition

Survey estimate was 3.30 compared with the census figure of 3.24.

Any percentage figure from the North Carolina Nutrition Survey sample may be interpreted as an estimate of the true percentage for all of North Carolina. Any North Carolina Nutrition Survey percentage estimate may be converted to an estimate of the categorical total for North Carolina as follows: for household statistics, multiply the percentage estimate by 1,578,000; for preschool children's statistics, multiply the percentage by 470,400. Other estimates of totals may be preferred. The Public Health Statistics Section of the State Board of Health would be glad to advise on these procedures.

TABLE 1

PERCENTAGE DISTRIBUTIONS OF NORTH CAROLINA HOUSEHOLDS BY REGION, RACE, AND PLACE OF RESIDENCE

	1960 Census Enumeration [7]	1970 Census Enumeration [8]	1970 NCNS Estimates
Number of Households	1,204,715	1,508,972	1,578,000
Region			
Percent Eastern	26.7	25.6	26.5
Percent Piedmont	44.5	45.7	38.6
Percent Western	28.8	28.7	35.0
Race			
Percent White	79.2	81.4	82.5
Percent Nonwhite	20.8	18.6	17.5
Place of Residence			
Percent Urban	42.0	Not Available	40.4
Percent Rural	58.0		59.6

TABLE 2

PERCENTAGE DISTRIBUTIONS OF 1970 NORTH CAROLINA HOUSEHOLD POPULATION BY REGION

	Census Enumeration	NCNS Estimates
Total Household Population	4,893,257	5,211,600
Percent Eastern	26.9	29.3
Percent Piedmont	45.1	38.6
Percent Western	28.0	32.1

B. Demographic Characteristics

1. Region, Race and Residence

Table 3 shows the race and residence distributions of households in each region. Seventy-six percent of both the Eastern and Piedmont households were white; in the Western region, 94 percent were white.

All regions were predominantly rural. There was little difference between the number of urban and rural households in the Piedmont region. Seventy-six percent of the Eastern households were in rural places; that is, places under 2500 population in 1960.

TABLE 3

NUMBER OF HOUSEHOLDS IN THE SAMPLE AND ESTIMATES OF DISTRIBUTION BY RACE AND RESIDENCE
NORTH CAROLINA NUTRITION SURVEY, 1970

Race and Residence	Region					
	Eastern		Piedmont		Western	
	Number	Percent	Number	Percent	Number	Percent
Total	348	100.0	507	100.0	460	100.0
White	265	76.1	387	76.3	433	94.1
Nonwhite	83	23.9	120	23.7	27	5.9
Urban	84	24.1	244	48.1	203	44.1
Rural	264	75.9	263	51.9	257	55.9

2. Household Composition

Average household size was estimated to be 3.3 persons, ranging from 3.0 in the Western region to 3.7 in the Eastern region. For all regions, the average household size was greater for rural households than for urban households, and greater in nonwhite households than in white households.

One out of five households included one or more preschool children (ages one through five years). Thirty percent of the Eastern households included preschoolers compared with approximately 18 percent of the Piedmont and Western households. Larger percentages of rural households and nonwhite households had preschool children than did urban or white households. For the State, the number of children ages one through five years was estimated to be 470,400.

One out of five households included at least one member over 65 years of age. The percentage of households with aged members was highest in the Western region (20%) and lowest in the Eastern region (16%).

C. Socio-economic Characteristics

1. Income

The respondent in each household was shown a chart depicting 18 income levels and was asked to indicate the level which most nearly represented the gross household income during the previous year. The income levels were then grouped as follows:

Under $1,500.00
$1,500 - $2,999
$3,000 - $5,999
$6,000 - $8,999
$9,000 and over

The median reported income was $6,438, based on responses from 90 percent of the sample households (Table 4). Average household income was highest in the Western region and lowest in the East. Median income for whites was twice that for nonwhites in the East and in the Piedmont. With the exception of the Eastern region, median incomes were higher in the urban areas.

TABLE 4
MEDIAN REPORTED HOUSEHOLD INCOME
NORTH CAROLINA NUTRITION SURVEY, 1970

Race and Residence	Total	Region		
		Eastern	Piedmont	Western
Total	$6,438	$6,159	$6,244	$6,708
White	7,000	6,759	7,419	6,815
Nonwhite	3,444	3,122	3,507	4,330
Urban	6,944	5,000	6,892	7,321
Rural	6,180	6,463	5,745	6,211

Twenty-two percent of the households reported incomes below $3,000; 25 percent reported incomes of $3,000 to $5,999; another 25 percent reported incomes of $6,000 to $8,999. Low incomes (under $3,000) were more prevalent in the East than in the Piedmont and West.

On a per capita basis, an estimated one out of five households in North Carolina have reported incomes under $1,000 per household member. The percentage of households with per capita incomes under $1,000 was:

27% in the East,
21% in the Piedmont,
14% in the West.

2. Food Preparation Facilities

Food preparation facilities were classified as substandard if a household was without piped-in water, stove, oven or means of refrigeration. By these criteria, it is estimated that approximately 10 percent of North Carolina households had substandard facilities at the time of survey (Table 5). Lack of piped-in water was reported in 80 percent of households with substandard food preparation facilities.

TABLE 5

ESTIMATED PERCENTAGE OF HOUSEHOLDS WITH SUBSTANDARD FOOD PREPARATION FACILITIES NORTH CAROLINA NUTRITION SURVEY, 1970

Race and Residence	Total	Region		
		Eastern	Piedmont	Western
Total	9.5	12.1	12.1	4.6
White	3.5	3.0	2.6	4.6
Nonwhite	37.9	41.0	42.9	4.0
Urban	1.7	2.4	2.9	0.0
Rural	14.8	15.3	20.6	8.2

More than 40 percent of the nonwhite households in the Eastern and Piedmont regions had substandard facilities. Rural households in all three regions were more often without standard facilities than were urban households. The West had a smaller percentage of households with substandard facilities (5%) than did the East (12%) or Piedmont (12%).

Taking population density into consideration, half of all households with substandard food preparation facilities were in the Piedmont region. Of further interest is the fact that 43 percent of the inadequately equipped households had total incomes under $1,500. More than two-thirds were nonwhite households.

3. Food Program Participation

The determination of eligibility of a household for participation in either the food stamp or donated commodities food distribution plans was made on the basis of household size and reported household income. The basic criteria used are those of the North Carolina Department of Social Services, although income groups utilized by the North Carolina Nutrition Survey do not conform precisely. As a result, the estimate of the number eligible for participation may be biased slightly upward. The extent of this bias, however, is considered negligible.

Eighteen percent of the households were found to be eligible for participation in one of the food programs. Eligibility differentials appeared to conform to the median income differences observed in Table 4.

Participation was reported by 35 percent of the eligible households. In the East, Piedmont,and West participation of eligible households was reported as 43,37, and 21 percent respectively.

D. Homemaker Characteristics

1. Education of the Homemaker

For all regions the mean educational level of homemakers was approximately 10 years of schooling. Forty-four percent of the homemakers had completed less than 11 years of schooling. Seventy percent of the non-white homemakers, compared with 38 percent of the white homemakers, had completed fewer than 11 years of schooling.

Ten percent of the homemakers had completed 16 or more years of schooling. The Western and Piedmont regions had higher percentages at this level (13% and 11% respectively) than did the Eastern region (3%)

2. Employment of the Homemaker

Forty-two percent of the households included a homemaker who was employed outside the home. Forty percent of the Eastern and Western homemakers worked outside the home; the comparable percentage for Piedmont homemakers was 45 percent.

In approximately 16 percent of the households, a female homemaker was also the head of household. Forty percent of these head-of-household homemakers worked outside the home.

3. Nutrition Knowledge of the Homemaker

Based on the four concepts of nutrition education as conceived by the Interagency Committee on Nutrition Education,(9) ten questions designed to test the nutrition knowledge of homemakers were administered verbally to homemaker respondents. Any tests inadvertently administered to non-homemaker respondents were subsequently eliminated. Every effort was made to present the questions in language understandable to homemakers of all educational levels. Pictures were used to further aid understanding. Scores ranged from zero to ten, higher scores indicating greater nutrition knowledge.

To pretest the mechanism, the questions were administered to an experimental group of state employees of various educational levels and to a control group of Raleigh Dietetic Association members, all of whom had had extensive training in nutrition. The control group achieved a mean score of 9.2. Experimental group participants of upper, middle and lower income levels (reflective of relative educational levels) achieved mean scores of 8.3, 8.1, and 4.4 respectively.

On the basis of the range of scores obtained in the pretest, nutrition knowledge test scores were grouped as follows:

Score	Knowledge of Basic Nutrition
0-3	Very limited
4-7	Limited
8-10	Good

Thirty-seven percent of the homemakers of this survey achieved a high score representing good nutrition knowledge. Ten percent evidenced very limited knowledge. The average score of 6.5 was approximately the same for all regions.

E. Summary of Population Characteristics

Each geographical region of the State, as determined for this survey, would seem to have its own peculiar demographic and socio-economic characteristics. Predominantly rural, the Eastern region had larger families which included more preschool children, fewer aged members and had more economically and educationally disadvantaged households than did the Western and Piedmont regions. The Western region, on the other hand, had relatively few nonwhite households. These households had fewer members and included more elderly people. The Western region also had the highest median income, most educationally advantaged homemakers and the fewest households with substandard food preparation facilities.

As the middle region geographically, the Piedmont was also "in the middle" for most of the demographic and socio-economic factors examined. With racial distribution more like that of the Eastern region, and urban-rural distribution more like the West, the Piedmont contributed substantial numbers to both extremes of the education and economic distributions. Compared with the other regions, Piedmont households were more often headed by a female, and Piedmont homemakers were more often employed outside the home.

It should be stressed that geographical definitions of the Eastern, Piedmont, and Western regions vary in published reports. See Figure 1 for the distribution of counties used in this survey.

CHAPTER VI

QUALITY OF DIET AMONG HOUSEHOLDS

A. Standards for Evaluation of Dietary Data.

Dietary data were collected by obtaining a record of the food consumed from the home food supply on the day prior to the interview. The household record was the respondent's recall of foods consumed by all members of the household, including preschool children. Individual recall records were also taken for children ages one through five years. The children's data are reported in Chapter VII.

The 24-hour household dietary intakes were classified according to the household consumption of calories and five nutrients: protein, iron, calcium, vitamin A value, and vitamin C (ascorbic acid). The amount consumed by a household has been expressed as a percent of the daily intake judged to be adequate for the age, sex, weight and meal pattern characteristics of the household members.

The reference standards utilized in this survey are shown in Table 6. They are the same as those used by the National Nutrition Survey except for calcium and vitamin A value. A comparison of the North Carolina Nutrition Survey standards with dietary standards from other sources

TABLE 6

STANDARDS FOR EVALUATION OF DAILY NUTRIENT INTAKE NORTH CAROLINA NUTRITION SURVEY, 1970

Age	Sex	Wt (kg)	Calories (per kg)	Protein (gm per kg)	Calcium (mg)	Iron (mg)	Vit A (IU)	Other (All Ages)
Months								
0-1	M&F	4.1	120	2.2	688	10	1070	
2-5	M&F	6.8	110	2.2	688	10	1070	Thiamin 0.4 mg per 1000 calories
6-11	M&F	9.0	100	2.2	688	10	1070	
Years								
1	M&F	11.4	90	1.9	561	15	1430	
2-3	M&F	14.6	86	1.7	561	15	1430	Riboflavin 0.55 mg per 1000 calories
4-5	M&F	18.5	82	1.5	561	10	1430	
6-7	M&F	23.2	82	1.3	561	10	1785	
8-9	M&F	29.0	82	1.3	561	10	1785	
10-12	M	35.8	68	1.2	813	10	1785	Niacin 6.6 mg per 1000 calories
	F	37.5	64	1.2	813	18	2500	
13-16	M	53.2	60	1.2	813	18	2500	
	F	52.5	48	1.2	813	18	2500	
17-19	M	64.7	44	1.1	688	18	2500	
	F	57.3	35	1.1	688	18	2500	Ascorbic Acid (Vitamin C) 30 mg daily
20-29	M	74.9	40	1.0	500	10	2500	
	F	62.4	35	1.0	500	18	2500	
30-39	M	78.0	38	1.0	500	10	2500	
	F	65.9	33	1.0	500	18	2500	
40-49	M	78.5	37	1.0	500	10	2500	
	F	69.3	31	1.0	500	18	2500	
50-59	M	78.5	36	1.0	500	10	2500	
	F	71.6	30	1.0	500	18	2500	
60-69	M	76.6	34	1.0	500	10	2500	
	F	72.0	29	1.0	500	10	2500	
70 & over	M	75.6	34	1.0	500	10	2500	
	F	69.8	29	1.0	500	10	2500	
Add to basic standards:								
	Pregnant		200	20.0	400		1000	
	Lactating		1000	25.0	500		1000	

TABLE 7

COMPARATIVE DAILY DIETARY STANDARDS FOR REFERENCE MAN

(Reference man is between 20 and 30 years of age, doing moderate work)

Country	Calories	Protein (gm)	Calcium (gm)	Iron (mg)	Vit. A (IU)	Thiamine (mg)	Riboflavin (mg)	Niacin (mg)	Vit.C (mg)
U. S. A.[a]	2,800	65	0.8	10	5,000	1.4	1.7	18	60
Canada [b]	2,850	50	0.5	6	3,700	0.9	1.4	9	30
United Kingdom [b]	3,000	87	0.8	12	5,000	1.2	1.8	12	20
N.N.S.[c]	2,996	77	0.4	10	3,500	1.2	1.7	20	30
N.C.N.S.[d]	2,996	77	0.5	10	2,500	1.2	1.7	20	30

a Data drawn from: National Academy of Sciences, Recommended Dietary Allowances (7th ed; Washington, D.C.: NAS, 1968). (10)

b Manual for Nutrition Survey (2nd ed; Bethesda, Md: ICNND, National Institutes of Health, 1963) p. 264. (11)

c U. S. Regional Medical Programs Service. Division of Chronic Disease Programs. Nutrition Program (1969) Standards for Evaluation of Nutrient Intake, Bethesda, Md. (12)

d See Table 6 of this report, page 30.

is shown in Table 7. The conservatism of the North Carolina standards is apparent.

Information was collected on food consumed exclusively from the home food supply. When the intake measured was less than the total day's actual intake of the household because one or more members ate one or more meals away from home, an adjustment was made by relating the number of meals each individual consumed from the home source to the total number of meals eaten by the individual during the 24-hour period of recall. A comparable proportion of the individual's standard was taken as his contribution to the household standard. In other words, a meal eaten away from the home source was said to contribute a third or a half of the dietary standard for the individual depending upon whether that individual ate 2 or 3 meals during the day.

B. Data Characteristics

As already explained, the dietary data of this survey are based upon a record of food consumed during a 24-hour period. Since week-end living patterns and eating habits may be atypical, the record was taken only for week days, Monday through Friday.

While it is true that one day's intake may not be representative of the dietary habits of an individual household, an observed high incidence of single day deficiencies within a group would seen indicative of regularly poor diets for many households within the group. As Schaefer has pointed out, "It is well known that one day's food intake cannot be used to appraise the adequacy of an individual diet since any particular day may not be representative of the usual food intake. Nevertheless, when daily food consumption of a large proportion of any population group fails to meet the standards required for adequacy, it is almost certain that many individuals within the group will consume poor diets regularly."(13)

Due to limitations inherent in the recall mechanism, it is certain that some overstatement and understatement of actual food intakes occurred. Discrepancies between actual and reported intakes were kept to a minimum through the use of food models. Moore has shown that food models serve to improve the reliability of the amounts reported.(14)

The food models used in this survey were provided by the National Nutrition Survey. These were designed in conjunction with a program for data processing so that an electronic computer was used for determining the nutrient values of food consumed. Errors in converting food portions to nutrient values were therefore restricted to the limitations of the food composition tables of USDA Handbook No. 8(15) and the Tulane Dietant.(16)

Dietary data were obtained for 1,188 households, or

90 percent of the households selected for interview. For the remaining 127 households, dietary data were insufficient to allow for evaluation of nutrient intake.

While it may be unlikely that serious bias would result at this level of missing data, it is appropriate to ask whether the response group differed from the group for which dietary data are not available. Comparisons for several demographic and socio-economic factors reveal no marked differentials. Nonresponse was equally likely for all regions, and almost always, the level of nonresponse or incomplete response to the dietary questions varied between 7 and 12 percent for any population group. The occurrence of missing dietary data was more prevalent in the questionnaires of aged persons living alone (19%) than for any other group of respondents.

For the demographic and socio-economic factors being related to dietary data, missing values rarely reached a level of more than 10 percent for the total sample. When both dietary and the population data are missing, however, the total level of missing data is compounded. For example, in studying the relationship between dietary adequacy and family income, only those households for which both diet and income data are available can be considered. In this case, missing data resulted in the elimination of 19 percent of the households. Other results shown in this report are based upon varying levels of response.

Levels of missing data that are unusually high will be noted in the discussion of survey results. In examining the percentage estimates presented, the reader should be mindful of these levels.

C. Rating of Quality of Diet

On the basis of the percents of standard calculated for five nutrients, a household diet has been rated according to the following criteria:

Optimum:	Met North Carolina Nutrition Survey standard for 5 nutrients
Adequate:	Met at least half of the North Carolina Nutrition Survey standard for 5 nutrients but less than North Carolina Nutrition Survey standard for 1 or more nutrients.
Inadequate:	Met less than half of the North Carolina Nutrition Survey standard for 1 or more nutrients.

For each population group studied, detailed tables show the percentage of diets which failed to meet half of the North Carolina Nutrition Survey standard for calories and the five nutrients. When examining these percentages, the reader should observe the number of households in each population group as well as the number of households for which the particular population data were not obtained.

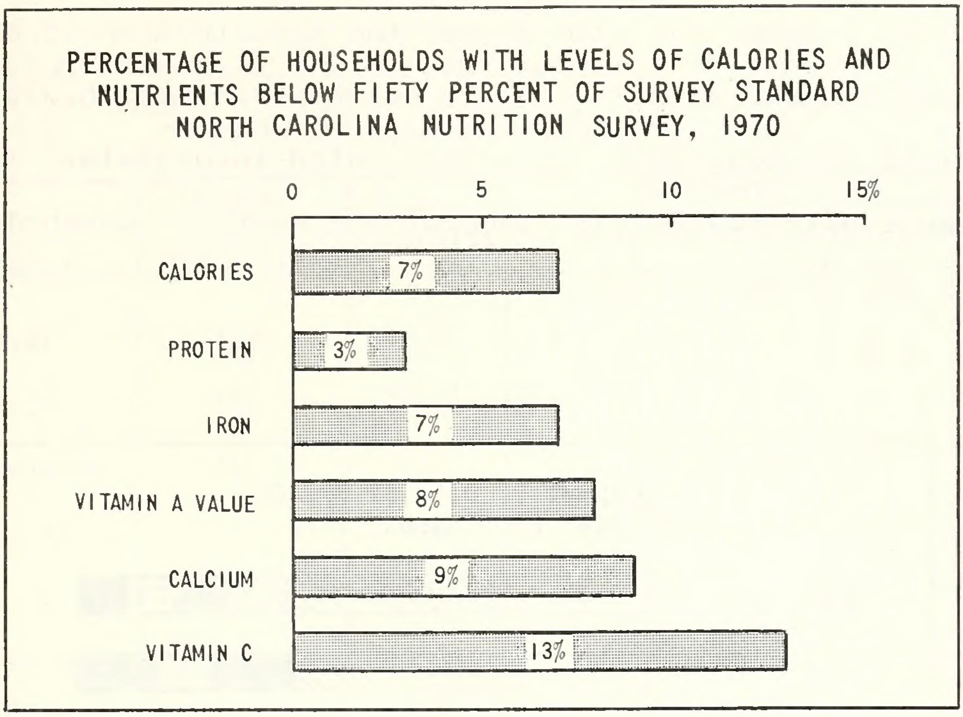
D. Diet Quality and Demographic Characteristics

The State

Findings of the North Carolina Nutrition Survey, for the entire state, show that 27 percent of the households had diets that were rated optimum; 46 percent of the households had diets rated adequate and 27 percent of North Carolina household diets were rated inadequate. These latter diets were, in our opinion, of unquestioned poor quality. Two-thirds of the diets that were rated inadequate contained less than 50 percent of standard for only one nutrient. In addition, 9 percent of the households with inadequate diets were below 50 percent of standard for three or more nutrients.

Figure 2 shows the percentage of household diets which supplied less than 50 percent of standard for calories and five nutrients. Nutrients most often below half of standard were vitamin C (13%), calcium (9%), and vitamin A value (8%). Iron levels below half of standard were encountered among 7 percent of the households. Compared to these, low protein diets were relatively infrequent (3%). Seven percent of the household diets failed to supply at least half of the standard for calories.

Figure 2


PERCENTAGE OF HOUSEHOLDS WITH LEVELS OF CALORIES AND NUTRIENTS BELOW FIFTY PERCENT OF SURVEY STANDARD
NORTH CAROLINA NUTRITION SURVEY, 1970

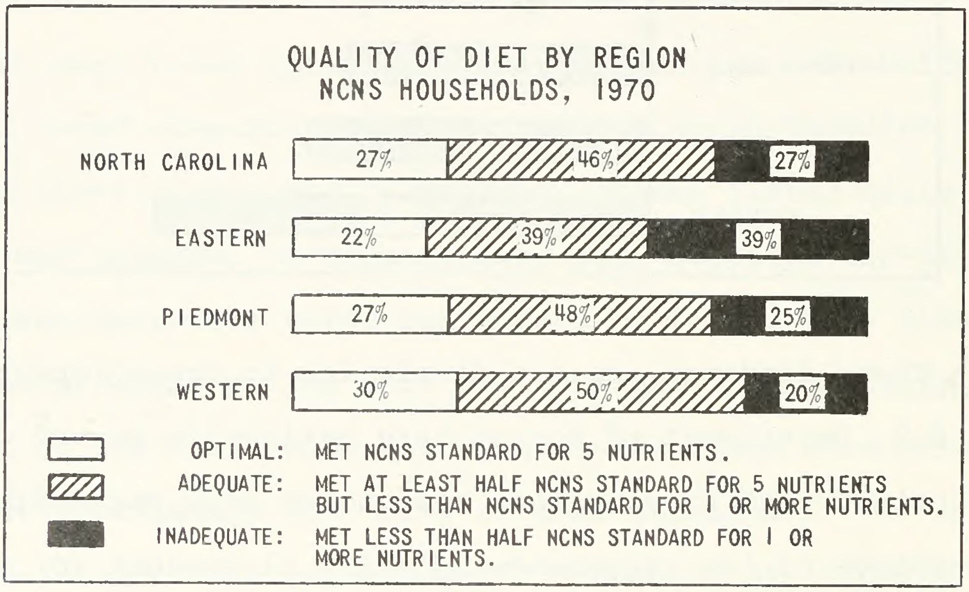
These findings are not dissimilar to those reported by the U.S. Department of Agriculture nationwide survey conducted in Spring, 1965 showing that households were more often below two-thirds of the recommended dietary allowances for vitamin C, vitamin A value and calcium, in that order (17).

The "Statistical Abstract of the United States: 1970" stated that 23.5 percent of North Carolina households had poor diets according to USDA criteria.(18) Reporting for the United States, as a whole, the U.S. Department of Agriculture found the percentage of households with poor diets had increased from 15 to 21 percent during the ten year period 1955 to 1965.(17)

Region

Figure 3 shows for each region the distribution of households according to quality of diet. In the Eastern region, 39 percent of the household diets were rated inadequate. The comparable percentages for Piedmont and Western households were 25 and 20 percent respectively.

Figure 3



Regional differences were greatest for vitamin C, calcium and vitamin A, in that order (Table 8). Low levels of these nutrients were at least two times more frequent among Eastern region household than among Western region households. For all nutrients except iron, Piedmont households were intermediate between East and West households in the percentage of diets which failed to meet 50 percent of standard.

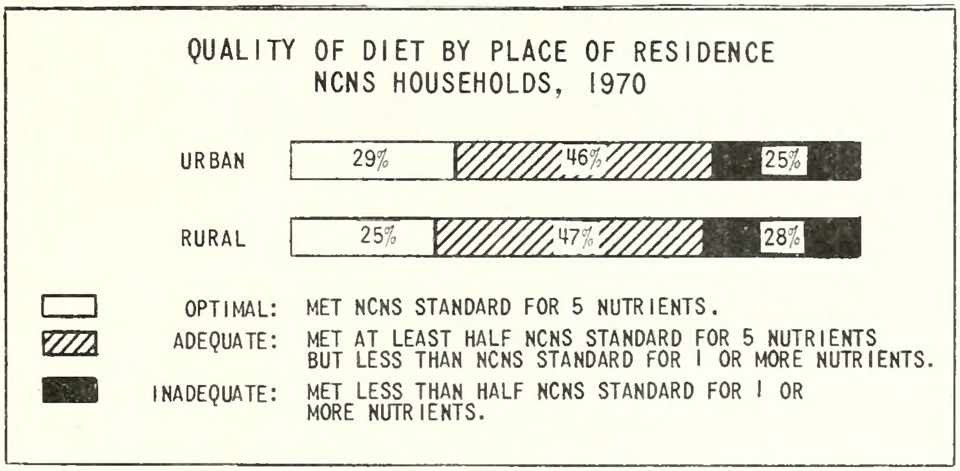
TABLE 8
PERCENTAGE OF HOUSEHOLDS WITH SINGLE DAY LEVELS OF CALORIES AND NUTRIENTS BELOW FIFTY PERCENT OF SURVEY STANDARD BY REGION NORTH CAROLINA NUTRITION SURVEY, 1970.

Region	Number of Households	Nutrients					
		Calories	Protein	Iron	Vit. A	Calcium	Vit. C
Total	1188	6.6	3.0	6.6	7.7	8.8	13.0
Eastern	320	8.7	4.7	7.2	10.9	13.1	20.3
Piedmont	454	6.8	3.1	4.8	8.4	8.4	12.3
Western	414	4.6	1.7	8.0	4.3	5.8	8.0

Place of Residence

As shown in Figure 4, place of residence differentials were small. Urban households had diets that were rated

Figure 4



optimum slightly more often than rural households and inadequate diets were slightly more prevalent among rural households. Due to population distribution, a major part of the dietary deficiency (63%) was observed in rural areas.

Figure 5 and Table 9 show urban and rural comparisons for calorie and nutrient inadequacies. Nutrients are ordered according to the prevalence of inadequacy among rural households. Low vitamin levels were more prevalent in rural areas; iron and calcium deficiency were more frequent among urban households. These same urbanization differences were observed in the USDA nationwide survey. (17)

Figure 5

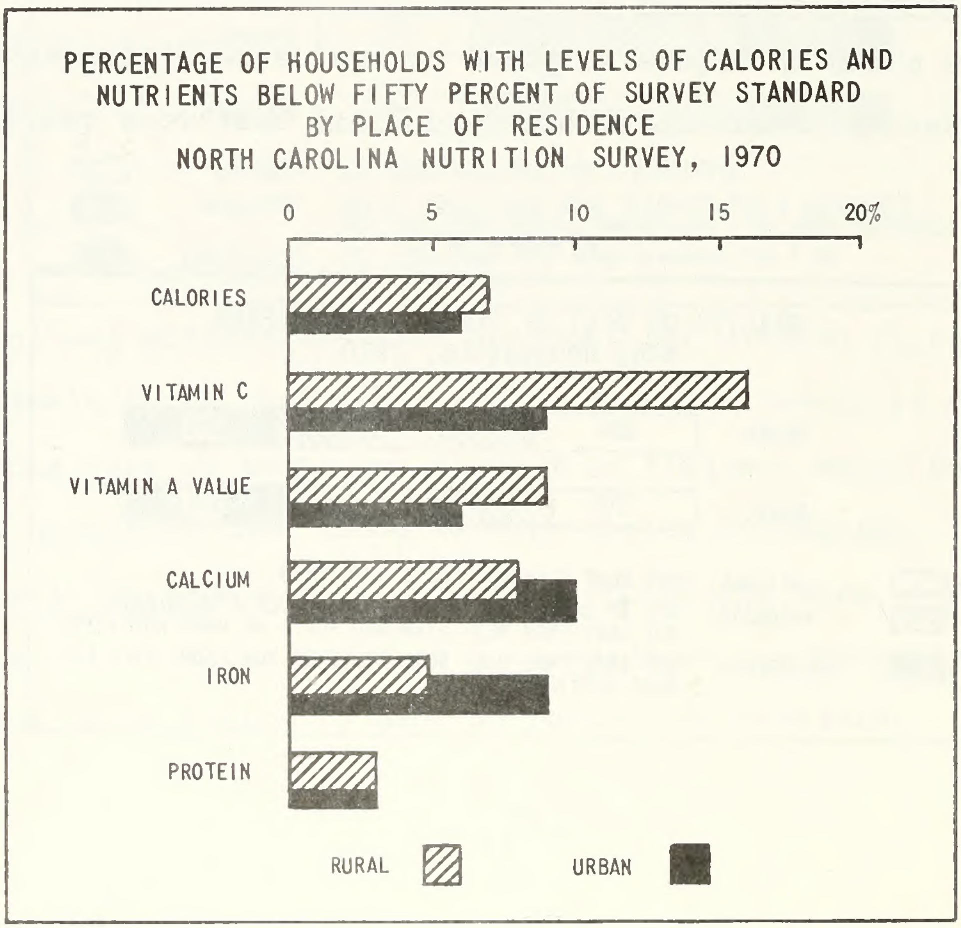


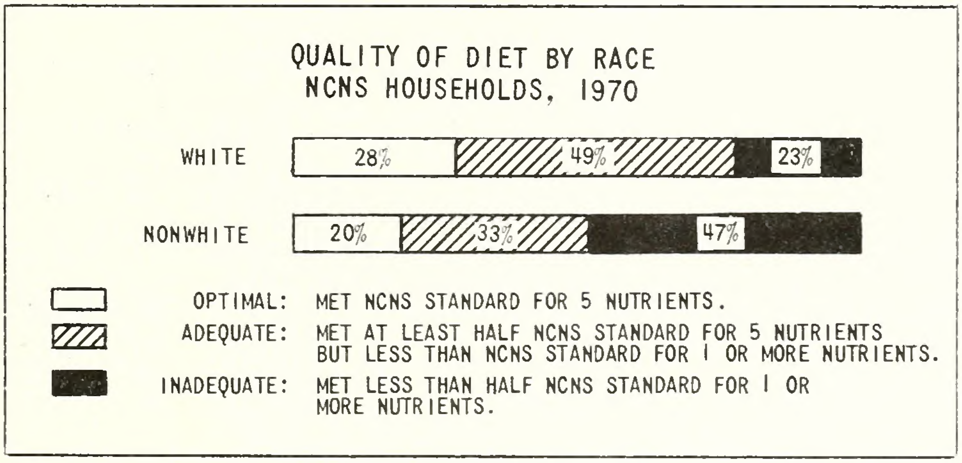
TABLE 9
PERCENTAGE OF HOUSEHOLDS WITH SINGLE DAY LEVELS OF CALORIES AND NUTRIENTS BELOW FIFTY PERCENT OF SURVEY STANDARD BY PLACE OF RESIDENCE
NORTH CAROLINA NUTRITION SURVEY, 1970

Residence	Number of Households	Nutrients					
		Calories	Protein	Iron	Vit. A	Calcium	Vit. C
Total	1188	6.6	3.0	6.6	7.7	8.8	13.0
Urban	471	6.2	2.5	8.7	5.5	10.4	8.9
Rural	717	6.8	3.3	5.2	9.1	7.7	15.6

Race

Forty-seven percent of the nonwhite households, compared with 23 percent of the white households, had diets which were rated inadequate (Figure 6). Nonwhites were two to three times more likely than whites to be below half of

Figure 6



standard for vitamin C, calcium, and vitamin A value (Table 10). White households, on the other hand, were more frequently inadequate in iron and protein.

TABLE 10

PERCENTAGE OF HOUSEHOLDS WITH SINGLE DAY LEVELS OF CALORIES AND NUTRIENTS BELOW FIFTY PERCENT OF SURVEY STANDARD BY RACE
NORTH CAROLINA NUTRITION SURVEY, 1970

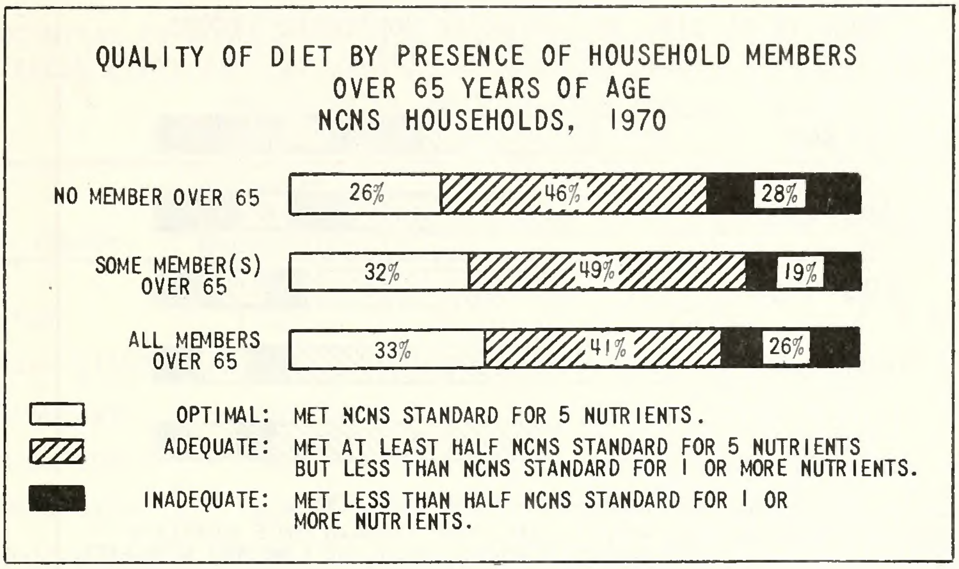
Race	Number of Households	Nutrients					
		Calories	Protein	Iron	Vit. A	Calcium	Vit. C
Total	1188	6.6	3.0	6.6	7.7	8.8	13.0
White	974	6.7	3.3	7.2	6.0	6.7	9.7
Nonwhite	214	6.1	1.9	3.7	15.4	18.2	28.0

Due to a preponderance of white households in the state, more than two-thirds of the observed dietary inadequacy was found among white. Ninety percent of the observed dietary iron inadequacy occurred among white households.

Household Composition

Figure 7 shows differences between households which included persons 65 years of age and over and those which included no aged persons. It would appear that households with aged persons had optimum diets slightly more often than

Figure 7



did other households. Single aged persons were, however, more often unable or unwilling to give complete dietary data than were other groups of respondents so that nutrient values were not available for 19 percent of this population subgroup.

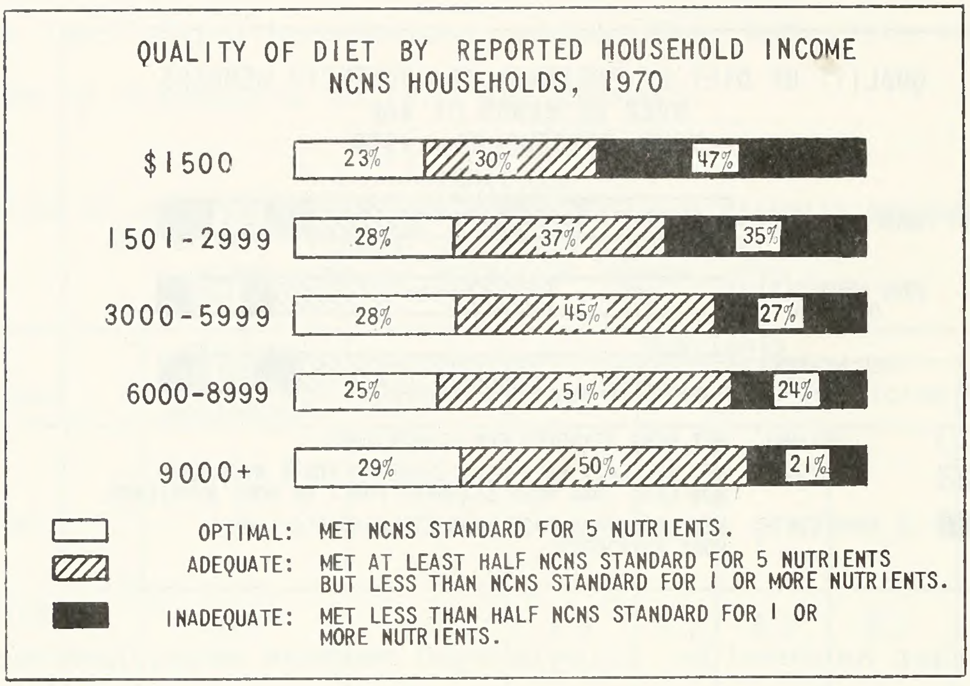
E. Diet Quality and Socio-economic Characteristics

Income

Figure 8 shows the distribution of households according to quality of diet for each of five groups of reported annual household income. These percentages are based upon data from 81 percent of the household interviews.

The percentage of households with inadequate diets decreased as reported income rose, but high income did not

Figure 8



preclude the occurrence of inadequate diets; neither did it insure the consumption of an optimum diet. Among households reporting incomes of $9,000 or more, 21 percent had inadequate diets and 29 percent had optimum diets. Among households reporting incomes of $1,500 or less, only 23 percent had optimum diets.

Except for iron, low nutrient levels were more frequent among households with incomes under $1,500 than among households reporting higher incomes (Table 11).

On a per capita basis, inadequate diets were found in 43 percent of the households with per capita incomes under $1,000 and in 24 percent of the households with per capita incomes of $2,000 and over.

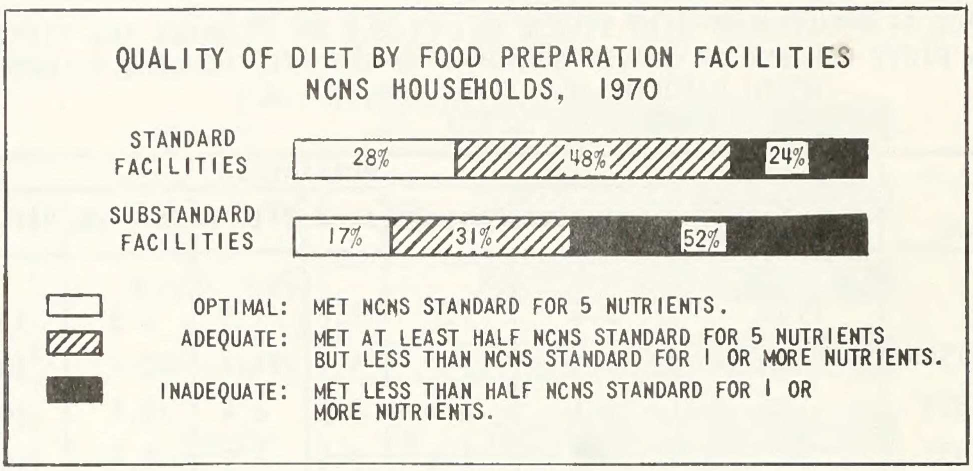
TABLE 11
PERCENTAGE OF HOUSEHOLDS WITH SINGLE DAY LEVELS OF CALORIES AND NUTRIENTS BELOW FIFTY PERCENT OF SURVEY STANDARD BY REPORTED HOUSEHOLD INCOME
NORTH CAROLINA NUTRITION SURVEY, 1970

Income	Number of Households	Nutrients					
		Calories	Protein	Iron	Vit. A	Calcium	Vit. C
Total	1188	6.6	3.0	6.6	7.7	8.8	13.0
Under $1500	129	12.4	7.8	4.7	21.7	22.5	18.6
$1500-2999	110	9.1	2.7	7.3	6.4	15.5	20.9
$3000-5999	262	6.9	2.3	7.6	6.9	8.4	15.3
$6000-8999	256	6.3	1.6	3.1	5.9	7.0	12.1
$9000 & over	314	3.8	2.9	9.2	4.1	3.5	8.6
Unknown	117	5.1	3.4	6.0	8.5	6.0	7.7

Food Preparation Facilities

The dietary data have been examined in relation to the adequacy of food preparation facilities (Figure 9). Approximately 10 percent of the households indicated substandard facilities; that is, no piped-in water or absence of either a stove, oven, or means of refrigeration. Absence of piped-in water was the limiting factor in the majority of these households. Inadequate diets were more than twice as frequent in the absence than in the presence of standard food preparation facilities.

Figure 9



Food Program Participation

On the basis of the eligibility determinations made in this survey, households eligible for participation were more than twice as likely to have inadequate diets (Figure 10). No advantage appeared to accrue to eligibles from participation in a food program. In fact, 45 percent of eligible non-participants had inadequate diets versus 52 percent of participants.

Figure 10

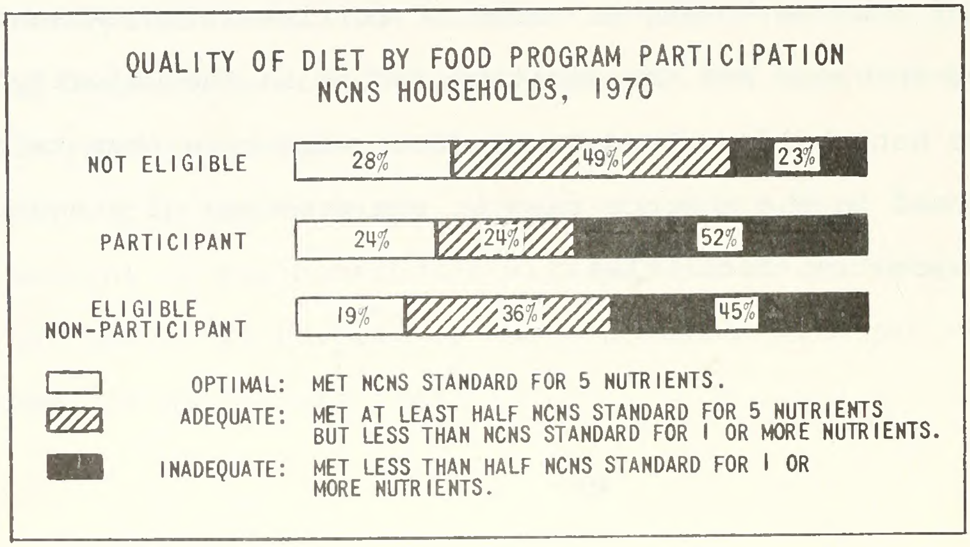
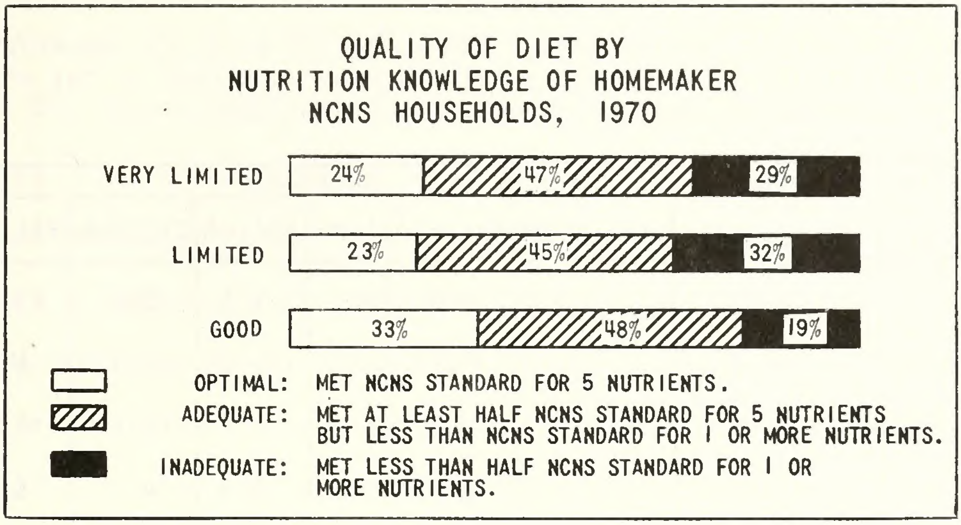


Figure 11



F. Diet Quality and Homemaker Characteristics

Nutrition Knowledge of the Homemaker

Inadequate diets occurred in 19 percent of the households whose homemakers had "good" nutrition knowledge. The comparable figure for those with "limited" and "very limited" nutrition knowledge were 32 percent and 29 percent respectively (Figure 11).

Table 12 indicates an upward trend in the dietary adequacy of vitamins A and C and of calcium, with increasing levels of nutrition knowledge of the homemaker. No such trend is apparent with regard to iron and protein.

Education of the Homemaker

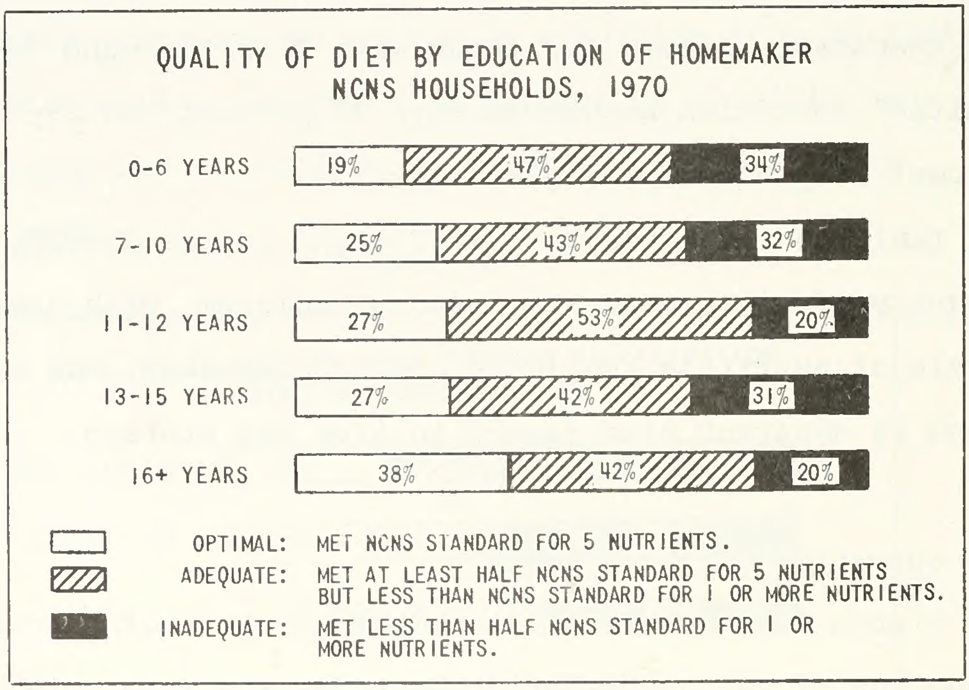
Figure 12 shows that the number of years of formal schooling of the homemaker seems to have a favorable

TABLE 12

PERCENTAGE OF HOUSEHOLDS WITH SINGLE DAY LEVELS OF CALORIES AND NUTRIENTS BELOW FIFTY PERCENT OF SURVEY STANDARD BY NUTRITION KNOWLEDGE OF THE HOMEMAKER NORTH CAROLINA NUTRITION SURVEY, 1970

Nutrition Knowledge of Homemaker	Number of Households	Nutrients					
		Calories	Protein	Iron	Vit. A	Calcium	Vit. C
Total	1188	6.6	3.0	6.6	7.7	8.8	13.0
Very limited	111	9.0	4.5	4.5	13.5	11.7	14.4
Limited	582	6.2	2.2	6.9	9.1	10.1	16.2
Good	401	5.5	3.0	6.5	3.5	4.7	8.5
Unknown	94	10.6	6.4	7.4	9.6	13.8	10.6

Figure 12



influence on quality of diet.

The diets of households whose homemakers had 16 or more years of schooling were less often rated inadequate and more often rated optimum than were diets of the group with 0-6 years of schooling. Whereas the proportion of households with optimum diets increased progressively as education increased, post high school training was found to be no assurance against the occurrence of inadequate diets.

Employment of the Homemaker

There was little difference found in quality of diet between households whose homemakers were employed outside the home and those who did not hold a job. Twenty-nine percent of the households of homemakers working outside the home had optimum diets as opposed to 25 percent of the non-working group. Twenty-seven percent of both groups had inadequate diets.

CHAPTER VII

QUALITY OF DIET AMONG PRESCHOOL CHILDREN

A. Data Characteristics

The assessment of nutritional status of the preschool child is of particular concern because of the relationship between early nutrition and growth.

Unfortunately, a regrettably high proportion of parents in sample households refused to allow the required anthropometric(height and weight) and hematologic (blood) determinations on their preschool children. Permission for the hematologic studies was obtained for 63 percent of the children. Height and weight measurements were obtained for 78 percent.

Refusal to allow the required measurements was higher among white parents, parents of female children, and parents of younger children (ages 1-3). Therefore, results for blood and growth factors are presented with qualification. On the other hand, dietary data were obtained for 95 percent of the preschoolers. For the response group, caloric and nutrient intake have been expressed as percents of the standards appropriate for the age, sex, weight, and meal pattern of each child.

The intakes measured do not include nutritive supplements, but represent nutritive values of food only. However, respondents were asked to indicate the child's use of vitamin and mineral supplements. These data are included in the findings.

Unlike the household data, a child's diet record was intended to include his total daily food intake irrespective of the food source. When complete dietary information was not obtainable, the child's reference standards required adjustment so that the standards were relative to the intake measured. The adjustment procedure was the same as that described for households where members did not eat all meals from the home source.

On the basis of the percents of standard calculated for five nutrients, a child's diet was rated optimum, adequate or inadequate according to criteria explained previously.

B. Diet Quality and Demographic Characteristics

The State

The total number of one through five-year-old children included in the sample was 392. Seventy-three percent were white; 54 percent were male; 69 percent lived in rural areas. Thirty-one percent lived in the Western region with the balance evenly distributed between the Eastern and Piedmont regions.

Seventeen percent of the preschool diets were rated optimum. Forty percent were rated adequate, and 43 percent were rated inadequate. Inadequacy in a single nutrient accounted for 60 percent of the latter group. Eleven percent of the inadequate group had diets that contained less than half of the standard for three or more nutrients.

Figure 13

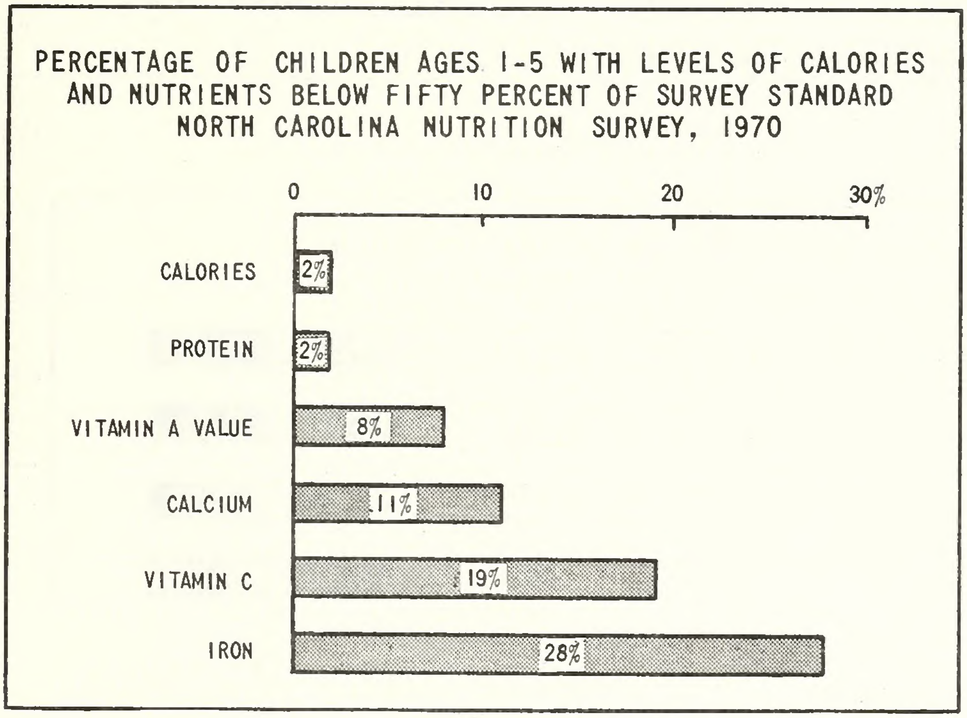
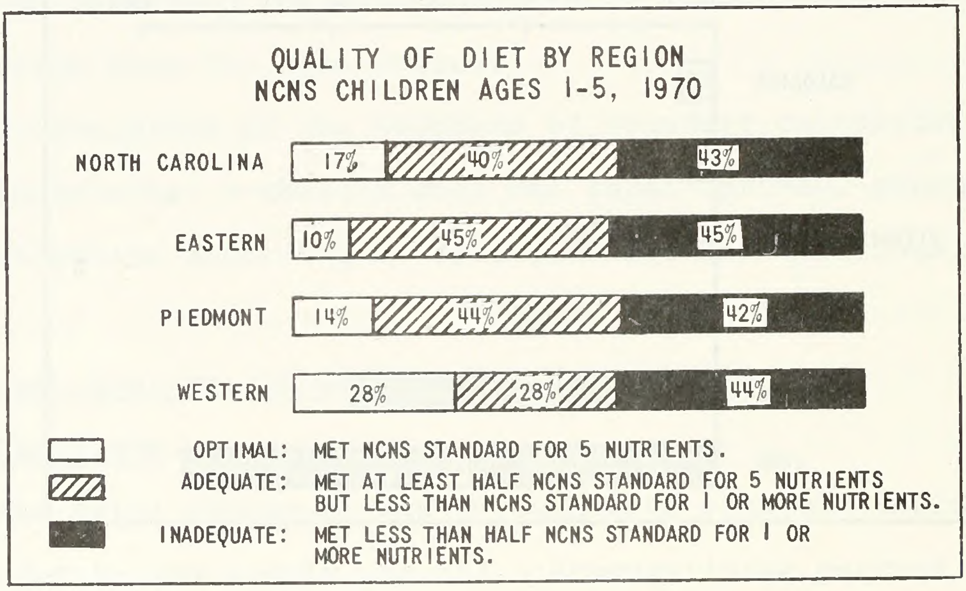


Figure 13 shows the percentage of diets which provided less than 50 percent of the North Carolina Nutrition Survey standard for calories and each of five nutrients. Twenty-eight percent failed to meet half of the standard for iron, 19 percent were below half of the vitamin C standard, 11 percent did not meet half of the calcium standard, and

8 percent failed to meet half the standard for vitamin A value. Protein intake and caloric intake were below half of standard for 2 percent.

Forty-eight percent of the children were reported to be using nutritive supplements (vitamins, minerals, or both) at the time of interview. Adequate diets were slightly more prevalent among these children than among children not using supplements. Inadequate diets occurred with equal frequency among users and non-users.

Figure 14



Region

Figure 14 shows that the percentage of children with inadequate diets was similar in all regions.

For all nutrients except iron, the percentage of children with levels below 50 percent of standard was lowest in the West (Table 13). Regional differences in the use of nutritive supplements were not observed.

TABLE 13
PERCENTAGE OF CHILDREN AGES 1-5 WITH SINGLE DAY LEVELS OF CALORIES AND NUTRIENTS BELOW FIFTY PERCENT OF SURVEY STANDARD BY REGION
NORTH CAROLINA NUTRITION SURVEY, 1970

Region	Number of Children	Nutrients					
		Calories	Protein	Iron	Vit. A	Calcium	Vit. C
Total	372	1.9	2.2	27.7	7.8	10.5	19.4
Eastern	134	2.2	3.7	30.6	15.7	9.0	21.6
Piedmont	128	2.3	1.6	20.3	5.5	18.8	19.5
Western	110	0.9	0.9	32.7	0.9	2.7	16.4

Place of Residence

Although adequate diets were encountered more frequently among children living in urban areas, percentages for inadequate diets were similar for urban and rural children(Figure 15). Urban-rural differentials were not notable for the individual nutrients (Table 14).

Sixty-one percent of the urban children, compared with 43 percent of the rural children, were reported to be using vitamins and/or minerals at the time of the interview.

Figure 15

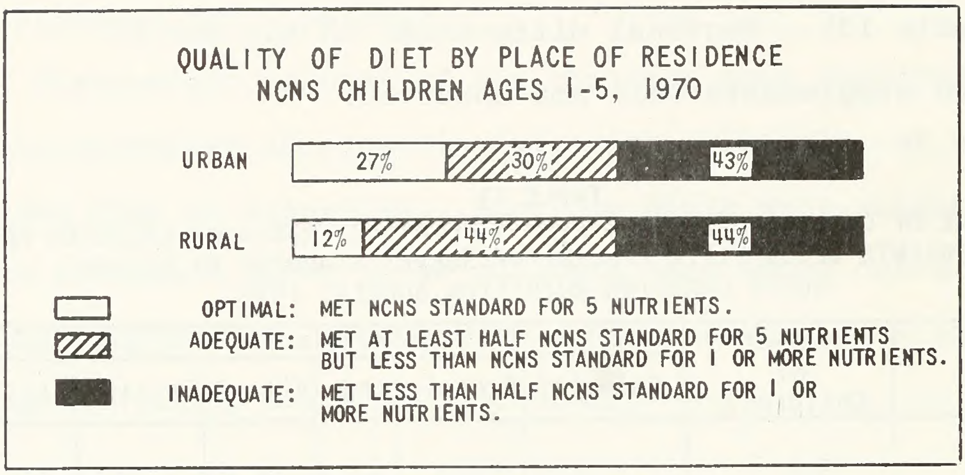


TABLE 14

PERCENTAGE OF CHILDREN AGES 1-5 WITH SINGLE DAY LEVELS OF CALORIES AND NUTRIENTS BELOW FIFTY PERCENT OF SURVEY STANDARD BY PLACE OF RESIDENCE NORTH CAROLINA NUTRITION SURVEY, 1970

Place of Residence	Number of Children	Nutrients					
		Calories	Protein	Iron	Vit. A	Calcium	Vit. C
Total	372	1.9	2.2	27.7	7.8	10.5	19.4
Urban	113	1.8	0.9	28.3	5.3	6.2	16.8
Rural	259	1.9	2.7	27.4	8.9	12.4	20.5

When considering these urban-rural differences, the reader should again be mindful of population distribution. The state is predominately rural. Therefore, the number of rural children with inadequate diets was more than twice the number of urban children.

Race

Figure 16 shows diets of white and nonwhite children distributed according to rating of dietary quality. Forty percent of white children versus 54 percent of the nonwhite children consumed inadequate diets.

Figure 16

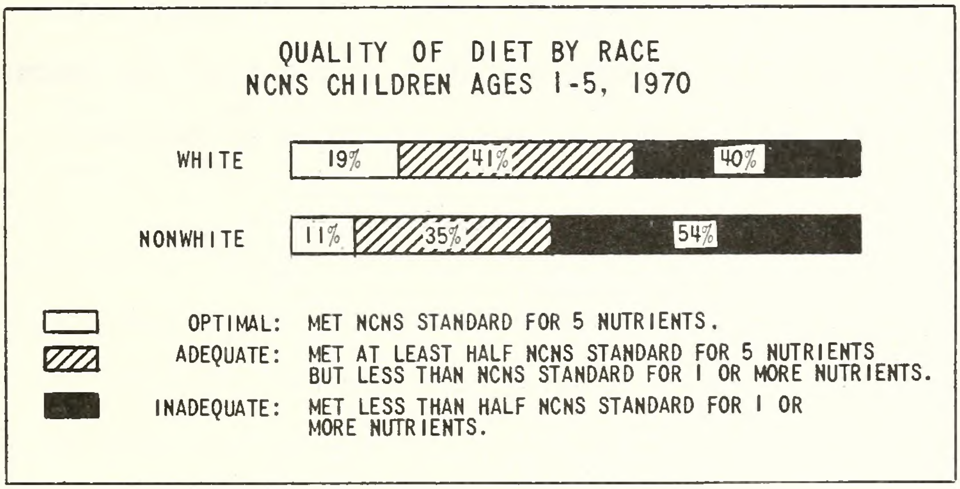


TABLE 15
PERCENTAGE OF CHILDREN AGES 1-5 WITH SINGLE DAY LEVELS OF CALORIES AND NUTRIENTS BELOW FIFTY PERCENT OF SURVEY STANDARD BY RACE NORTH CAROLINA NUTRITION SURVEY, 1970

Race	Number of Children	Nutrients					
		Calories	Protein	Iron	Vit. A	Calcium	Vit. C
Total	372	1.9	2.2	27.7	7.8	10.5	19.4
White	280	2.5	1.1	29.6	4.6	7.5	15.7
Nonwhite	92	0.0	5.4	21.7	17.4	19.6	30.4

Except for calories and iron, nonwhite children were below half of standard for individual nutrients considerably more frequently than white children (Table 15). Fifty-seven percent of the white children and 21 percent of the nonwhite children were said to be using nutritive supplements.

Sex

Female children evidenced inadequate diets more often than males (Figure 17). Inadequate iron intake occurred among 36 percent of the girls as compared with 21 percent of the boys(Table 16). Sex was not a differentiating factor in the use of nutritive supplements.

Figure 17

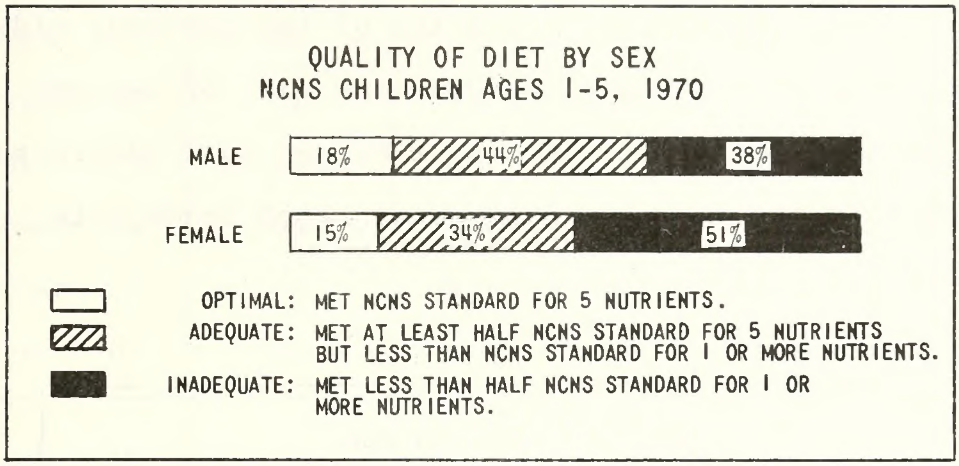


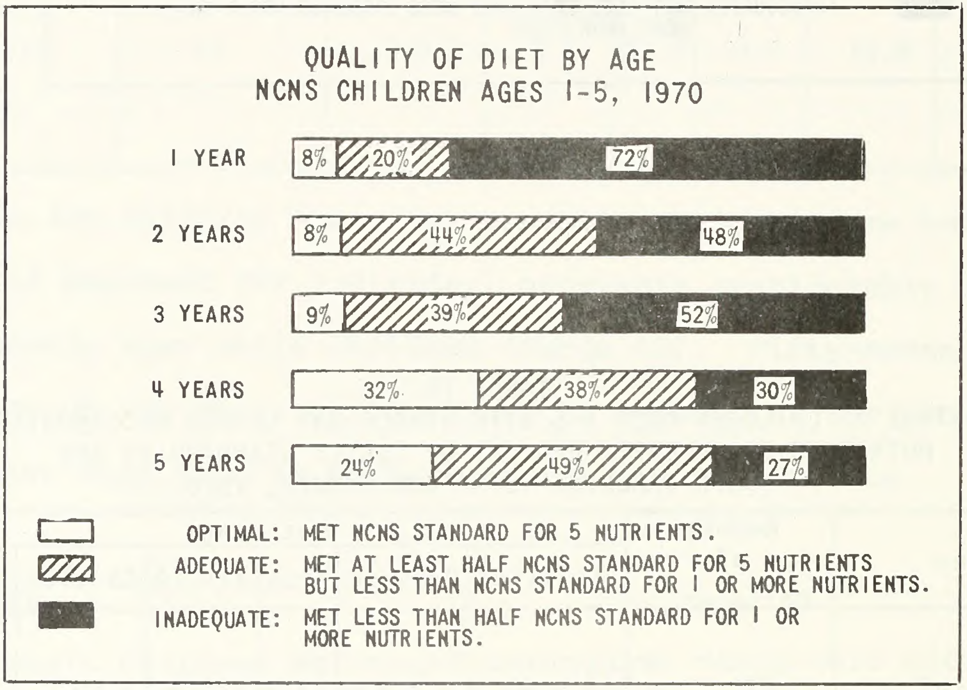
TABLE 16
PERCENTAGE OF CHILDREN AGES 1-5 WITH SINGLE DAY LEVELS OF CALORIES AND NUTRIENTS BELOW FIFTY PERCENT OF SURVEY STANDARD BY SEX NORTH CAROLINA NUTRITION SURVEY, 1970

Sex	Number of Children	Nutrients					
		Calories	Protein	Iron	Vit. A	Calcium	Vit. C
Total	372	1.9	2.2	27.7	7.8	10.5	19.4
Male	206	0.5	2.9	21.4	8.3	7.8	18.4
Female	166	3.6	1.2	35.5	7.2	13.9	20.5

Age

Figure 18 shows that dietary adequacy improved with advancing age. Nearly three-fourths of the one-year olds, and one out of two children between the ages of two and four, consumed inadequate levels of one or more nutrients. Diets of four and five-year olds were rated inadequate less often.

Figure 18



Low iron intake occurred most frequently among the younger children (Table 17). One-year olds were nearly eight times more likely than five-year olds to consume

TABLE 17
PERCENTAGE OF CHILDREN AGES 1-5 WITH SINGLE DAY LEVELS OF CALORIES AND NUTRIENTS BELOW FIFTY PERCENT OF SURVEY STANDARD BY AGE
NORTH CAROLINA NUTRITION SURVEY, 1970

Age	Number of Children	Nutrients					
		Calories	Protein	Iron	Vit. A	Calcium	Vit. C
Total	372	1.9	2.2	27.7	7.8	10.5	19.4
1 year old	51	2.0	2.0	54.9	9.8	21.6	29.4
2 years old	95	0.0	0.0	37.9	3.2	8.4	10.5
3 years old	69	2.9	8.7	44.9	15.9	8.7	18.8
4 years old	74	0.0	0.0	2.7	2.7	10.8	23.0
5 years old	83	4.8	1.2	7.2	9.6	7.2	20.5

inadequate levels. Low levels of vitamin C and calcium were also more frequent among one-year olds.

With regard to the one-year olds, it should be noted that nutrient content of commercially prepared baby food and milk formula were not calculated in this survey. The extent to which children's dietaries were affected by these exclusions is not known.

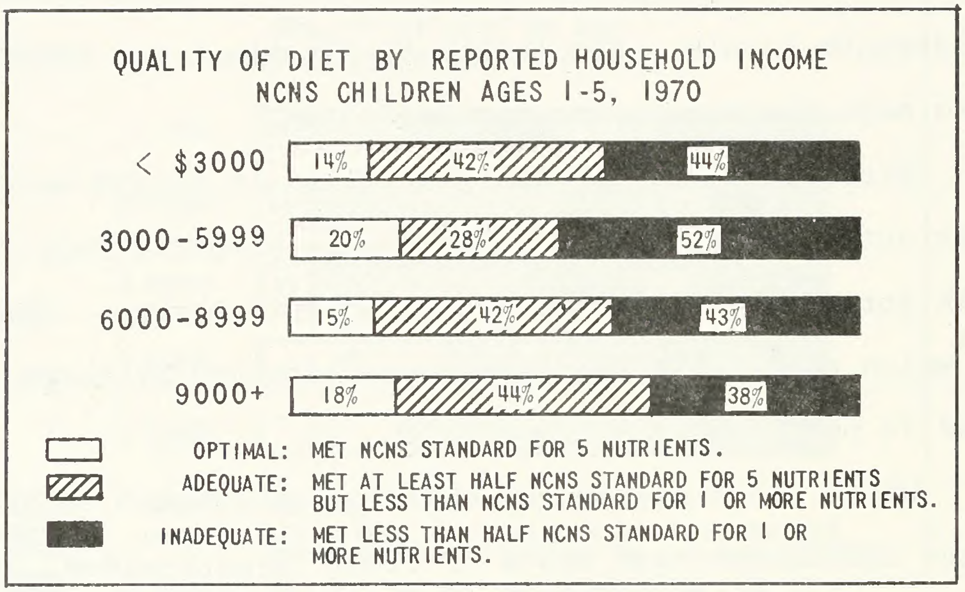
While diets of younger children were found to be more often inadequate than diets of older preschoolers, nutritive supplementation was more prevalent among the young. Fifty-nine percent of the one-year olds, compared with 42 percent of the five-year olds, were using vitamins and/or minerals at the time of interview.

C. Diet Quality and Socio-economic Characteristics

Income

Figure 19 relates quality of children's diets to reported household income. Children representing incomes of $9,000 or more evidenced inadequate diets only slightly less often than children representing lower incomes.

Figure 19



Improved nutrient intake with increasing family income was clearly shown only for calcium (Table 18).

Children of high income households used nutritive supplements much more frequently than children of low income households.

TABLE 18

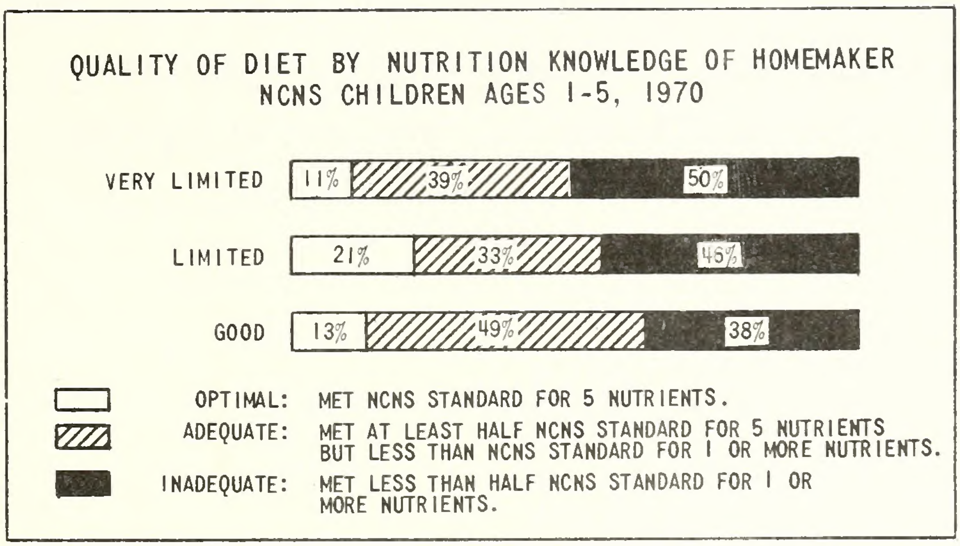
PERCENTAGE OF CHILDREN AGES 1-5 WITH SINGLE DAY LEVELS OF CALORIES AND NUTRIENTS BELOW FIFTY PERCENT OF SURVEY STANDARD BY REPORTED INCOME NORTH CAROLINA NUTRITION SURVEY, 1970

Family Income	Number of Children	Nutrients					
		Calories	Protein	Iron	Vit. A	Calcium	Vit. C
Total	372	1.9	2.2	27.7	7.8	10.5	19.4
Under $3000	36	5.6	5.6	19.4	5.6	16.7	22.2
$3000-5999	101	2.0	0.0	29.7	12.9	16.8	24.8
$6000-8999	113	2.7	5.3	31.0	9.7	8.8	15.0
$9000 & over	106	0.0	0.0	26.4	0.9	3.8	18.9
Unknown	16	0.0	0.0	18.8	12.5	12.5	12.5

D. Diet Quality and Nutrition Knowledge of the Homemaker

The test mechanism used in this survey to measure the homemaker's nutrition knowledge has been described in Chapter VI. Figure 20 shows the distribution of children's diets according to quality for each of the three levels of nutrition knowledge. Inadequate diets occurred less often

Figure 20



in the presence of a high test score representing "good" nutrition knowledge than in the absence of a high score.

TABLE 19
PERCENTAGE OF CHILDREN AGES 1-5 WITH SINGLE DAY LEVELS OF CALORIES AND NUTRIENTS BELOW FIFTY PERCENT OF SURVEY STANDARD BY NUTRITION KNOWLEDGE
NORTH CAROLINA NUTRITION SURVEY, 1970

Nutrition Knowledge of Homemaker	Number of Children	Nutrients					
		Calories	Protein	Iron	Vit. A	Calcium	Vit. C
Total	372	1.9	2.2	27.7	7.8	10.5	19.4
Very limited	18	5.6	0.0	27.8	27.8	16.7	22.2
Limited	196	3.1	1.5	29.6	6.6	12.2	23.0
Good	144	0.0	3.5	27.1	7.6	6.9	11.8
Unknown	14	0.0	0.0	7.1	0.0	14.3	42.9

Good nutrition knowledge was a favorable factor for the vitamins, particularly vitamin A value, but was not substantially differentiating for protein and iron (Table 19). Nutritive supplements were used slightly more often by children of the good knowledge group than by children representing homemakers of lesser knowledge.

E. Selected Clinical Measurements

Hematologic Determinations

The qualified nature of the data related to the hematologic studies has been discussed. With this in mind, the data were examined for the percentage of children exhibiting subnormal levels of hemoglobin, hematocrit and mean corpuscular hemoglobin concentration (MCHC). The latter determination is based upon the first two and provides a measurement of the proportion of hemoglobin contained in the average red cell of the sample of blood. The MCHC is virtually diagnostic of iron deficiency anemia. (Depressed levels occur in only one other rather rare blood disorder, Thalassemia.)

For the hemoglobin and hematocrit determinations, values less than 10.1 gm/100 ml and 31 percent respectively for one- and two-year-old children and values below 10.7 gm/100ml and 32 percent respectively for children three to five were considered to be subnormal. For all ages the lower limit of normal for the MCHC was considered to be 30 percent.

On this basis, 7 percent of children had an abnormally low hemoglobin whereas 4 percent had a low hematocrit. The percent with a low MCHC, the most definitive of the three for diagnosing iron deficiency anemia fell in between at 5 percent. Thus 1 out of 20 children manifested rather clear-cut evidence of iron deficiency anemia.

Anthropometry

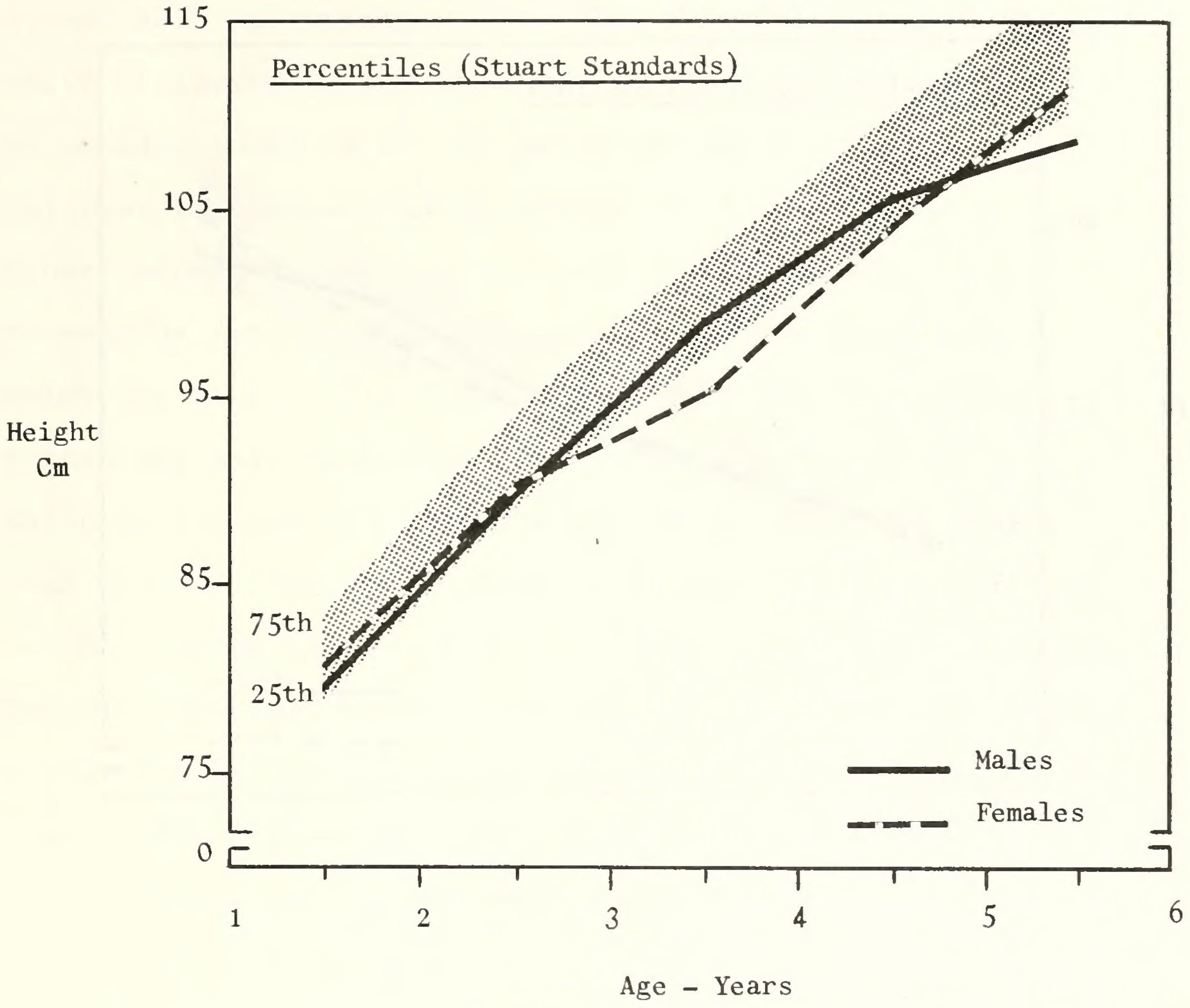
Figures 21 and 22 show age and sex-specific mean heights and weights of children for whom these measurements were obtained. Due to evidence for dissimilar growth rates of children born prematurely, subjects with birth weights under 2500 grams were excluded.

As a frame of reference, the Stuart growth curves for height and weight are also shown. The shaded area of each figure is the range for the middle 50 percent of the Stuart Children. These 25th and 75th percentile values are the average of the values for boys and girls obtained from percentile tables by Stuart and Meredith(19). The value used is the value for children midway their birthdates.

In comparing the North Carolina mean values with these growth curves, the reader should be aware that the Stuart curves are based on longitudinal data while the North Carolina data are not. Moreover, children of the Stuart study were white infants of North European ancestry who lived under normal conditions of health and home life in Boston, Massachusetts.

FIGURE 21

MEAN HEIGHT CURVES OF PRESCHOOL CHILDREN WITH BIRTHWEIGHTS GREATER THAN 2500 GRAMS COMPARED WITH THE STUART GROWTH STANDARDS NORTH CAROLINA NUTRITION SURVEY, 1970

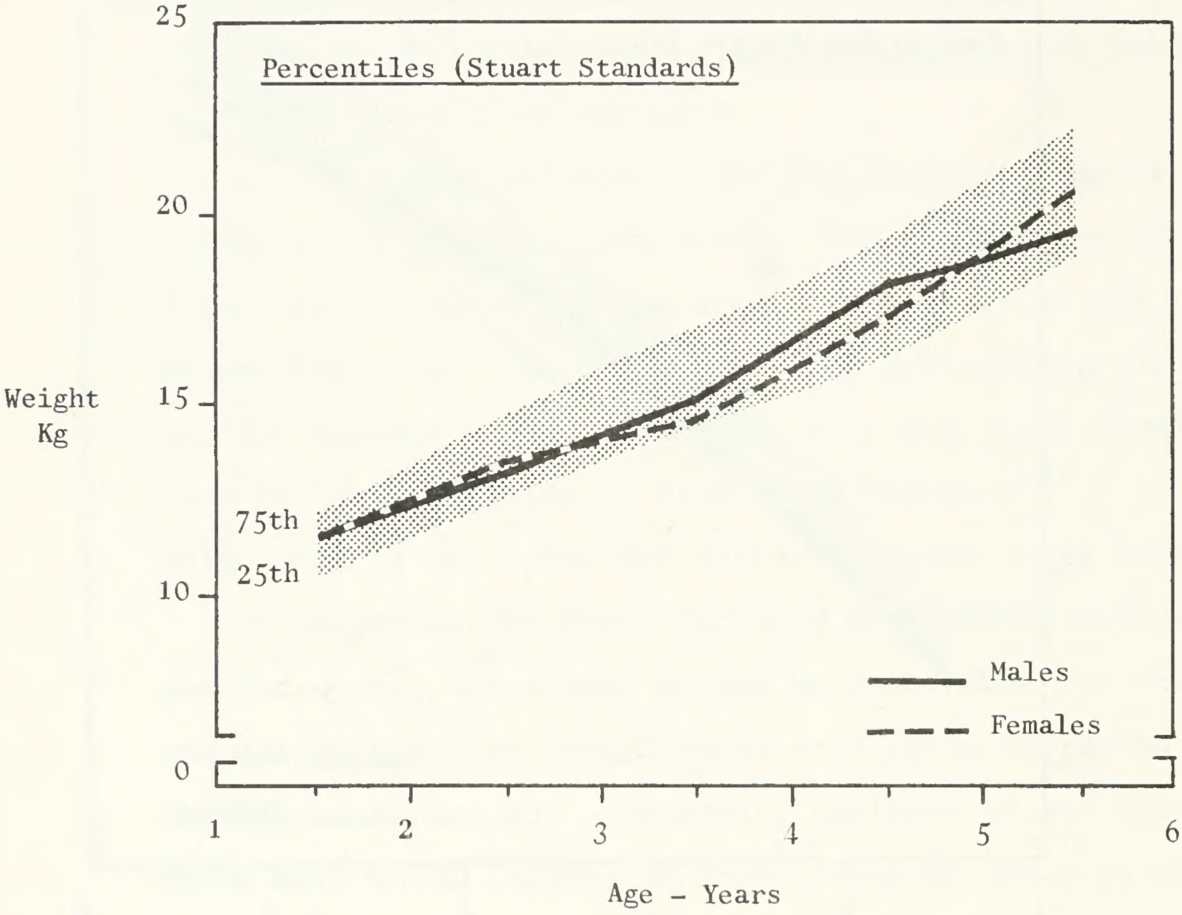


Number of values used in computing mean (n) and range of values:

Males	n	22	51	19	28	37
	High	80	100	100	110	120
	Low	60	70	90	90	90
Females	n	16	21	25	29	27
	High	91	103	105	117	120
	Low	69	80	65	95	100

FIGURE 22

MEAN WEIGHT CURVES OF PRESCHOOL CHILDREN WITH BIRTHWEIGHTS GREATER THAN 2500 GRAMS COMPARED WITH THE STUART GROWTH STANDARDS NORTH CAROLINA NUTRITION SURVEY, 1970



Number of values used in computing mean (n) and range of values:

Males	n	22	51	19	29	38
	High	13.5	15.0	18.0	24.0	27.0
	Low	7.5	9.0	13.5	12.0	13.5
Females	n	16	21	25	34	27
	High	15.0	18.5	18.5	27.5	30.5
	Low	7.0	11.0	12.0	9.5	11.0

Comparing heights of North Carolina children with heights of the Stuart children on a child-specific basis, 46 percent of the North Carolina children were found to be below the Stuart 26th percentile value. The percentage was 45 for white children, 51 for nonwhite children. The expected percentage would be 25, if growth of the North Carolina children was comparable to growth of children in the Stuart study. Sixty-four percent of the children from households reporting incomes from $3,000 to $5,999 were below the Stuart 26th percentile. This was the largest percentage deviation among the income groups. Piedmont children represented a larger percentage deviation (54%) than did children of the East (46%) and West (37%).

As already indicated, weight was much less deviant than height. However, weight differences were observed between population groups. The percentage of children below the Stuart 26th percentile was 31 for whites compared with 19 for nonwhites and was 35 percent for Piedmont children compared with 23 percent for Eastern and Western children.

In Figures 23 and 24, heights and weights of children are converted to Stuart percentiles and, for three classes of these percentiles, diets are depicted according to level of quality. Children classified as premature at birth have been excluded.

For both height and weight, a correlation was suggested between dietary adequacy and growth attainment. Weight was the more differentiating of the two factors.

Figure 23

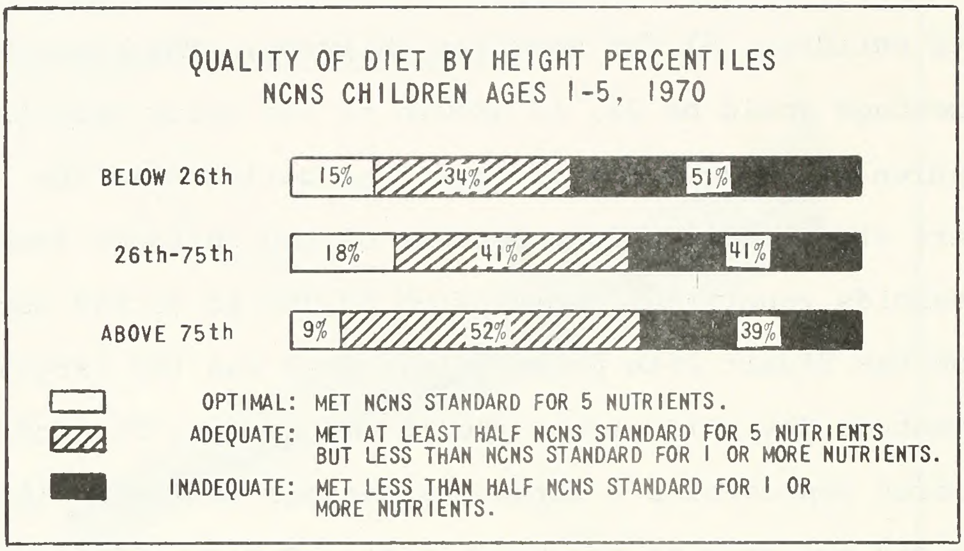
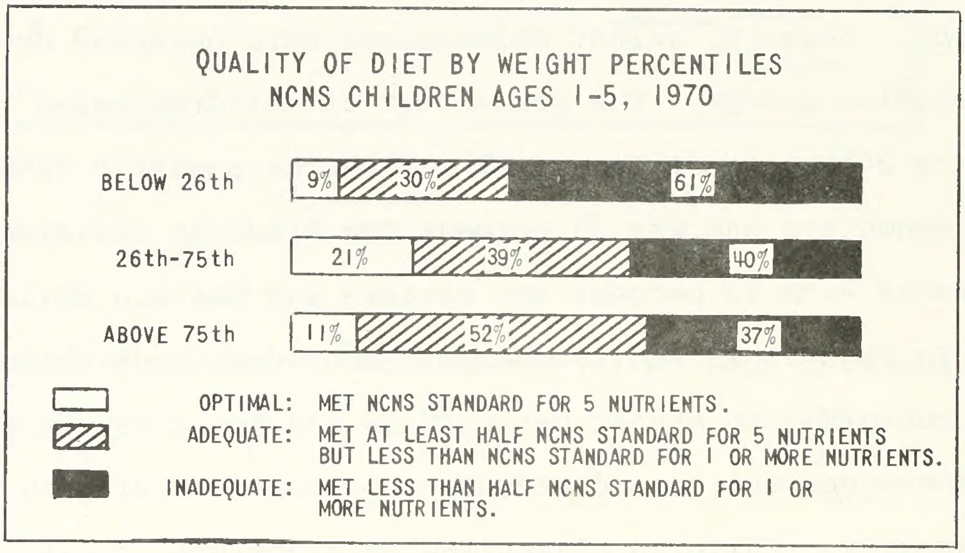


Figure 24



When actual numbers are considered, more than half of the children with inadequate diets were below the Stuart 26th percentile for height. Nutritive supplementation of diets was found to be unrelated to the height and weight of children.

CHAPTER VIII

SUMMARY OF FINDINGS

A. Introductory Comments

The North Carolina Nutrition Survey was designed to measure the nutritional status of North Carolinians. Heavy reliance was placed upon the assessment of dietary adequacy of a representative cross-section of North Carolina households. Careful attention to scientific sampling methods permitted the study to provide unbiased estimates of dietary adequacy according to economic conditions, urban-rural differences, region of state, race, age, certain educational factors, and other potentially important variables. By this means the survey staff hoped to identify the important barriers to attainment of a nutritionally adequate diet.

Current knowledge does not permit correlation between clinical examinations and dietary data; therefore, the conclusions are based on dietary information alone, except for evidences of iron deficiency anemia and growth retardation among preschool children. For this reason, a medical diagnosis of malnutrition or undernutrition (hunger) was not made on participants in the study.

The almost exclusive reliance upon dietary information in no way weakens the study. If answers are to be forthcoming to alleviate the existence of undernutrition and malnutrition among our citizens, those solutions will center upon action programs designed to assure each and every person, young and old, black and white, rich and poor, an adequate, nourishing diet.

With these introductory comments let us proceed to review the major findings of the North Carolina Nutrition Survey. It is anticipated that further analyses of the numerous data items will yield information for one or more subsequent reports.

B. Dietary Adequacy

Dietary data were obtained for 90 percent of households in the sample, a high survey response rate. Based upon a dietary adequacy rating developed by survey staff and described in Chapter VI, three out of four North Carolina households were consuming optimum or adequate diets. The figures for preschool children (95% response) were not as favorable. Forty-three percent of the children, versus 27 percent of the households, were consuming a nutritionally inadequate diet.

Dietary inadequacy occurred with greatest frequency among households from Eastern North Carolina (39%). When assessing the importance of this finding as well as several others to be reported, it would be useful to review the demographic information in Chapter V. Some demographic characteristics of the East were:

(1) High percent nonwhite
(2) Comparatively large family size
(3) Comparatively large number of preschoolers in household
(4) Comparatively low household income.

Statewide urban-rural differentials in dietary adequacy were minimal. A clear-cut differentiation was noted when considering race. Nonwhite households were more than twice as likely to have inadequate diets as were white households. Although it is possible that some culturally determined factors may have been operating, these figures more likely reflect other variables occurring with different frequencies among white and nonwhite households.

Turning then to potentially operating factors, the possible correlation with household purchasing power was studied. Reported household income was a significant variable; per capita income was even more so. Forty-three percent of households with per capita income under $1,000 had inadequate diets versus only 24 percent of those with per capita incomes over $2,000. Relative to the comment concerning racial differences made in the preceding paragraph it is important to note that the median reported household income for whites was $7,000 versus $3,444 for nonwhites (Table 4).

Another significant socio-economic indicator was the absence of adequate food preparation facilities in the home. Inadequate diets were more than twice as frequent in households rated substandard for these facilities.

A particularly disturbing finding was the complete lack of beneficial effect of participation in special food programs for the poor. In fact, 54 percent of eligible nonparticipants had optimal or adequate diets versus 48 percent of participants. Of additional interest was the fact that only 35 percent of eligible households were participating in one or more of these special programs. Since the collection of dietary data was completed in May,1970, there has been a 25 percent increase in participation in all food programs, according to the Department of Social Services.

It was felt extremely desirable to measure the nutrition knowledge of the homemaker, a variable not previously correlated with dietary adequacy. Optimal or adequate diets were found in 81 percent of the households in which the homemakers had "good" nutrition knowledge. The comparable figures for those with "limited" and "very limited" nutrition knowledge were 68 and 71 percent respectively.

C. Individual Nutrients

The most commonly deficient nutrients were vitamins A and C and the mineral calcium. Deficiency in these three nutrients correlated best with race, region and income, the variables which showed the most apparent relationships were overall dietary quality.

Dietary iron intake was inadequate in only 7 percent of households but was inadequate in 28 percent of the diets of preschool children. The fact that only 5 percent of the children had clinically established iron deficiency anemia (See Chapter VII,Part E) may possibly be explained by the fact that a number of the children may have been taking medicinal iron. Also, the very small number of children studied for anemia weakens the reliability of the 5 percent figure. No correlation of iron intake with the various other variables was apparent. Diets low in protein were notably infrequent (3%).

D. Growth of North Carolina Preschool Children

It would appear from the height and weight data that North Carolina children are somewhat shorter on the average if one uses as a reference the Stuart Growth Standards. Of greatest interest was the suggestion of a relationship between dietary adequacy and growth attainment (See Figures 23 and 24).

We would be remiss if we did not point out that, despite the observed relationships between dietary adequacy and certain variables such as economic status, inadequate diets were not precluded by the presence of high income, good nutritional knowledge, or by any other factor for that matter. Yet one cannot dismiss lightly, we believe, the suggested correlations established by the study.

In this land of unequalled prosperity, it is quite unacceptable that one out of every four families is not consuming an adequate and nourishing diet. We hope and trust that those responsible for programs in North Carolina will find the material contained here illuminating, useful, and beneficial to all.

APPENDIX

NORTH CAROLINA NUTRITION SURVEY QUESTIONNAIRES

IDENTIFICATION AND GENERAL INFORMATION, NORTH CAROLINA NUTRITION SURVEY FORM (NC-IA)

FORM I.A. NORTH CAROLINA NUTRITION SURVEY

1. Address: House No. or P.O. Box No.________________
Street or Route________________
City or Town________________
State________ZIP Code________County________

2. Phone________

DO NOT WRITE IN THIS BOX

A. Identification Codes Start Card 1:
State (1-2) 5 6
County (3-5) ☐☐☐
E.D.(6-7) ☐
Dietary Code(13 ☐
Household No.(8-9) ☐☐
Family(10) ☐
(11-12) 8 8

(3) Indiv. Code	(4) Last Name	(5) First Name	(6)(7) Birth dates			(8) Sex		(9) Ht.		(10) Wt.	(11) Relation to Family Head	(12) Now in School	(13) Number of Years of School Completed
			Month	Day	Year	Male	Female	Ft.	In.	Lbs.			
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													

NS/SBH/69

DIETARY HOUSEHOLD ROSTER, NATIONAL NUTRITION SURVEY FORM (NNS-VIII)

VIII.

NATIONAL NUTRITION SURVEY

DIETARY—Household Roster

LAST NAME

ADDRESS *(Street, City, State, ZIP Code)*

Budget Bureau No. 68-S68029
Approval expires June 30, 1970

A. IDENTIFICATION—Start card number 1

State (1-2)

County (3-5)

E.D. (6-7)

Household (8-9)

Family (10)

Subject's line No. (11-12) | 0 | 1 |

Dietary Code (13)

Respondent's line No. (14-15)

Date of examination (16-21)

Mo.	Day	Year

(Repeat columns 1-10 and 14-21 from subject 01)

Sex Code (column 28)
1—Male
2—Female, not pregnant
3—1° pregnant
4—2° pregnant
5—Lactating
6—1° Lactating and pregnant
7—2° Lactating and pregnant

Meals Eaten Code (col. 33-36)
0—Ate from home source
1—Ate from other source
2—Did not eat
3—Does not know

Meal Pattern Code (col. 37)
0—None
1—All meals
2—Only a.m.
3—Only noon
4—Only evening
5—a.m. and noon
6—a.m. and evening
7—Noon and evening

Special Diet Code (col. 38)
0—None
1—Diabetes
2—Caloric restriction
3—Na. restriction, pregnant
4—Na. restriction, other
5—Other

Reliability of Height and Weight Code (col. 49)
1—Both actual
2—Weight estimated
3—Height estimated
4—Both estimated

Completion Code (col. 75)
0—Completed
1—Refusal
2—Not available
3—Informant incapable
4—Other

	Last and first name of residents plus yesterday's guests for meals			DATE OF BIRTH				MEALS EATEN YESTERDAY *(Code)*					SPECIAL DIET		ANTHROPOMETRY				
SUBJECT'S Line No.	LAST NAME	FIRST NAME	DIETARY CODE	Month	Day	Year	SEX AND PREGNANCY STATUS *(Code)*	A.M.	NOON	P.M.	BETWEEN MEALS	USUAL HOME MEAL PATTERN *(Code)*	SPECIAL DIET *(Code)*	DOCTOR PRESCRIPTION *(1—No 2—Yes 8—Not appl.)*	UNITS 1—kgs. 2—lbs.	WEIGHT	HEIGHT *(mm)*	HEIGHT AND WEIGHT RELIABILITY	Line No.
(11-12)			(13)	(22-23)	(24-25)	(26-27)	(28)	(33)	(34)	(35)	(36)	(37)	(38)	(39)	(40)	(41-44)	(45-48)	(49)	
01																			01
02																			02
03																			03
04																			04
05																			05
06																			06
07																			07
08																			08
09																			09
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16

Comments:

Completion code (75)

Interviewer's name and number (76-77)

Card Number 1 (78-80) | 0 | 8 | 1 |

NCCD-3-8 (D.C.)
REV. 3-69

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE—PUBLIC HEALTH SERVICE
DIVISION OF CHRONIC DISEASE PROGRAMS—NUTRITION PROGRAMS
4040 NORTH FAIRFAX DRIVE, ARLINGTON, VIRGINIA 22203

U.S. GOVERNMENT PRINTING OFFICE : 1969 OF—330-497
882-336

24-HOUR DIETARY RECALL FOR HOUSEHOLDS, NATIONAL NUTRITION SURVEY FORM (NNS-VIIIB)

VIII. B.

NATIONAL NUTRITION SURVEY

DIETARY—24 Hour Recall—Household

LAST NAME	ADDRESS *(Street, City, State, ZIP Code)*	Budget Bureau No. 68-S68029 Approval Expires June 30, 1970

A. IDENTIFICATION (Start card No. 2)

State (1-2)	County (3-5)	E.D. (6-7)	Household (8-9)	Family (10)	Subject line No. (11-12)	Dietary code (13)	Respondent's line No. (14-15)	Date of Recall *Mo.*	Date of Recall *Day*	Date of Recall *Year* (16-21)
					8 8					

C. FOOD ITEMS (Punch a new card for each food code. Repeat cols. 1-21 for each card)

INGESTION PERIOD	FOOD CODES					FOODS AND BEVERAGES CONSUMED		WORK AREA FOR COMPUTATION	SIZE OF EDIBLE PORTION SERVED			TIME OF DAY
									I	II	III	
(24)	(25)	(26)	(27)	(28)	(29)	FOOD ITEM	DESCRIPTION		(30-34)	(35-39)	(40-44)	

Ingestion Period Code *(Column 24)* 1—a.m. 4—p.m. 2—Noon lunch 5—School lunch 3—Between meals 9—Total day	Completion Code *(Column 75)* 0—Completed 3—Informant incapable 1—Refused 4—Other 2—Not available	Day of week of recall (74)	Completion code (75)	Interviewer's Name and Number (76-77)	Card Number 3 (78-80) 0 8 3

NCCD-3-88 (D.C.)
REV. 3-69

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE—PUBLIC HEALTH SERVICE
DIVISION OF CHRONIC DISEASE PROGRAMS—NUTRITION PROGRAM
4040 NORTH FAIRFAX DRIVE, ARLINGTON, VIRGINIA 22203

U.S. GOVERNMENT PRINTING OFFICE : 1969 OF—339-139

24-HOUR DIETARY RECALL FOR CHILDREN AGES 1-5 YEARS, NATIONAL NUTRITION SURVEY FORM (NNS-XIII) (Continued)

Part C.—Continuation *(If needed)*

INGESTION PERIOD	FOOD CODES					FOOD CONSUMED		WORK AREA FOR COMPUTATIONS *(If needed)*	SIZE OF EDIBLE PORTION SERVING			TIME OF DAY	SOURCES OF FOOD	
						FOOD ITEM	DESCRIPTION		I	II	III			
(24)	(25)	(26)	(27)	(28)	(29)				(30-34)	(35-39)	(40-44)		(49)	
													1-T 3-B 2-H 4-J	
													1-T 3-B 2-H 4-J	
													1-T 3-B 2-H 4-J	
													1-T 3-B 2-H 4-J	
													7-T 3-B 2-H 4-J	
													1-T 3-B 2-H 4-J	
													1-T 3-B 2-H 4-J	
													1-T 3-B 2-H 4-J	
													1-T 3-B 2-H 4-J	
													1-A 3-B 2-H 4-J	

Part D.—Continued from Part A

1. Is this what (he) usually eats?
   1—Yes 4—Less: no food available
   2—More food 5—Less: mother ill
   3—Less: illness 6—Less: other
   (36) ☐

2. Is (he) taking vitamins or minerals now?
   1—No 4—Both
   2—Vitamins 9—Unknown
   3—Minerals
   (37) ☐

3. Does (he) usually take these vitamins and/or minerals daily?
   1—No 8—Not applicable
   2—Yes 9—Unknown
   (38) ☐

4. How old was (he) when he started taking these? (Months)
   88—Not applicable 99—Unknown
   (39-40) ☐☐

5. Was (he) ever breast fed?
   1—No 2—Yes 9—Unknown
   (41) ☐

6. If breast fed, at what age were other milks started? (Months)
   77—Not yet
   88—Not applicable
   99—unknown
   (42-43) ☐☐

7. At what age was (he) weaned, from the breast? (Months)
   77—Not yet
   88—Not applicable
   99—unknown
   (44-45) ☐☐

8. At what age was (he) weaned, from the bottle? (Months)
   77—Not yet
   88—Not applicable
   99—unknown
   (46-47) ☐☐

9. At what age were non-milk foods started? (Months)
   77—Not yet 99—unknown
   (48-49) ☐☐

Completion Code (75) ☐

Card Number 1 (78-80) 1 3 1

Remarks

Completion code (col. 75)
0—Completed
1—Refusal
2—Not available
3—Informant incapable
4—Other

Ingestion period code (col. 24)
1—A.M.
2—Noon
3—Between meals
4—P.M.
5—School Lunch
9—Total day

Sources of food code (col. 49)
1—T—Table
2—H—Home prepared (specially for baby)
3—B—Baby, prepared commercially
4—J—Junior, prepared commercially

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Rev. 3-69

U.S. GOVERNMENT PRINTING OFFICE : 1969 OF—339-701

24-HOUR DIETARY RECALL FOR CHILDREN AGES 1-5 YEARS, NATIONAL NUTRITION SURVEY FORM (NNS-XIII)

XIII.

NATIONAL NUTRITION SURVEY
DIETARY—24 HOUR RECALL—0-36 MONTHS

NAME

ADDRESS *(Street, City, State, ZIP Code)*

Budget Bureau No. 68-S68029
Approval Expires June 30, 1970

A. IDENTIFICATION (Start Card No. 1)

State (1-2) ☐☐
County (3-5) ☐☐☐
E. D. (6-7) ☐☐
Household (8-9) ☐☐
Family (10) ☐
Subject line No. (11-12) ☐☐
Dietary code (13) ☐
Respondent's line No. (14-15) ☐☐

Date of recall (16-21) Mo. ☐☐ Day ☐☐ Year ☐☐
Date of birth (22-27) Mo. ☐☐ Day ☐☐ Year ☐☐
Sex (28) ☐ 1—Male 2—Female

Ingestion Period (Col. 24)
1—A.M.
2—Noon
3—Between meals
4—P.M.
5—School lunch
9—Total Day

Source of Food code (Col. 49)
1T—Table Food
2H—Home prepared *(Special for baby)*
3B—Baby *(Commercially prepared)*
4J—Junior *(Commercially prepared)*

Completion code (Col. 75)
0—Completion
1—Refusal
2—Not available
3—Informant incapable
4—Other

Day of week of recall (74) ☐
Completion code (75) ☐
Interviewer number (76-77) ☐☐
CARD No. 2 (78-80) 1 3 2

Part A.

1. Was the milk (he) had yesterday (24 hours)
   a. Breast, if "yes,"
      1. Number of times *(00 if "None")* (29-30) ☐☐
      2. Was this
         1—Schedule 8—Not applicable
         2—Self demand (31) ☐
   b. Bottle, if "yes,"
      1. Number of times *(00 if "None")* (32-33) ☐☐
      2. Was the bottle
         1—Schedule 8—Not applicable
         2—Self demand (34) ☐
      3. Was dry skim milk part of donated food?
         (use only if formula had dry skim milk)
         1—Yes 2—No 8—Not applicable (35) ☐

Part B.—Start Card 2. Repeat Cols. 1-21 from Card 1:

INGESTION PERIOD	FOOD ITEM CODE					FORMULA ITEM	WORK AREA FOR COMPUTATIONS *(If needed)*	AMOUNT PREPARED		AMT. CONSUMED *(If less than total)*
								I	II	III
(24)	(25-29)							(30-34)	(35-39)	(40-44)
9	0	1	3	2	0	Milk, fresh, whole homog.				
9	0	1	3	2	4	Evaporated				
9	0	1	3	2	5	Condensed				
9	0	1	3	2	7	Dry skim (regular)				
9						Commercial formula				
9						(Brand:)				
9						Water				
9						Total formula volume				
9						Sugar				
9						Syrup-corn type				
9						Other (specify)				

Part C.—What other foods did (name) have yesterday?

INGESTION PERIOD	FOOD CODES					FOOD CONSUMED		WORK AREA FOR COMPUTATIONS *(If needed)*	SIZE OF EDIBLE PORTION SERVED			TIME OF DAY	SOURCE OF FOOD	
									I	II	III			
(24)	(25)	(26)	(27)	(28)	(29)	FOOD ITEM	DESCRIPTION		(30-34)	(35-39)	(40-44)		(49)	
													1-T 3-B 2-H 4-J	
													1-T 3-B 2-H 4-J	
													1-T 3-B 2-H 4-J	
													1-T 3-B 2-H 4-J	
													1-T 3-B 2-H 4-J	
													1-T 3-B 2-H 4-J	
													1-T 3-B 2-H 4-J	
													1-T 3-B 2-H 4-J	

NCCD-3-13 (D.C.)
Rev. 3-69

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE—PUBLIC HEALTH SERVICE
DIVISION OF CHRONIC DISEASE PROGRAMS—NUTRITION PROGRAM
4040 NORTH FAIRFAX DRIVE, ARLINGTON, VIRGINIA 22203

HOUSEHOLD DIETARY FREQUENCY, NATIONAL NUTRITION SURVEY FORM (NNS-XI)

XI.

NATIONAL NUTRITION SURVEY
DIETARY—Frequency (Household)

LAST NAME	ADDRESS *(Street, City, State, ZIP Code)*	Budget Bureau No. 68-S68029 Approval Expires June 30, 1970

A. IDENTIFICATION (Start Card Number 1)

State (1-2)	County (3-5)	E. D. (6-7)	House-hold (8-9)	Family (10)	Subject's Line No. (11-12)	Dietary code (13)	Respon-dent's Line No. (14-15)	Date of Interview (16-21) Mo.	Day	Year
☐☐	☐☐☐	☐☐	☐☐	☐	8 8	☐	☐☐	☐☐	☐☐	☐☐

B. How many times do you usually serve these foods to your family? As I read a food, tell me how many times a day, week, or month you serve it.

	No. of Times	Interval D1 W2 M3 Y4
1. Milk (Beverage and cereals) a. Whole fresh	(22-23)	(24)
b. Fresh skim or butter-milk	(25-26)	(27)
c. Evaporated (whole or skim)	(28-29)	(30)
d. Dry skim	(31-32)	(33)
2. Poultry	(34-35)	(36)
3. Fish	(37-38)	(39)
4. Mixed meat, fish poultry (Dishes, casseroles, stews, etc.)	(40-41)	(42)
5. Meat (Includes franks, luncheon meat, etc.)	(43-44)	(45)
6. Eggs	(46-47)	(48)

	No. of Times	Interval D1 W2 M3 Y4
7. Cheese and cheese dishes	(49-50)	(51)
8. Soups	(52-53)	(54)
9. Mature or dry peas and beans (Include nuts and peanut butter)	(55-56)	(57)
10. Cereals and grain products (Bread, rice, pasta, etc.)	(58-59)	(60)
11. a. Fruits and Vegetables rich in Vitamin C *(see guidelines)*	(61-62)	(63)
b. Vegetables rich in Vitamin A *(see guidelines)*	(64-65)	(66)
12. Other fruits and vegetables	(67-68)	(69)
Card Number 1		(78-80) 1 1 1

Begin Card No. 2 (Repeat Cols. 1-21 from card 1)

	No. of Times	Interval D1 W2 M3 Y4
13. Pastries and other desserts, (Including custards, ice cream, sherbets, etc.)	(22-23)	(24)
14. Jams, jellies, candies	(25-26)	(27)
15. Beverages *(see guidelines)* a. Sweetened beverages	(28-29)	(30)
b. Artificially sweetened beverages	(31-32)	(33)
c. Coffee or tea	(34-35)	(36)
d. Beer	(37-38)	(39)
e. Wine	(40-41)	(42)
f. Whiskey, gin, vodka, rum	(43-44)	(45)
16. Snack foods *(chips, corn chips, etc.)*	(46-47)	(48)

17. How many of your family usually eat together at:

a. The A.M. meal 1—All 2—None 3—Some	(49)
b. Noon meal 1—All 2—None 3—Some	(50)
c. P.M. meal 1—All 2—None 3—Some	(51)

18. How many of your household members usually eat one or more meals out? *(use actual number)*

a. Each day	(52-53)
b. 2-3 times a week	(54-55)
c. 4-5 times a week	(56-57)

AT OFFICE: FROM FORM VIII.

Total number of persons in household	(58-59)
Completion code	(75)
Interviewer's number	(76-77)
Card number 2	(78-80) 1 1 2

No. of Times code
00—None
99—Unknown

Interval code
D1—Daily W2—Weekly M3—Monthly Y4—Yearly

Completion code
0—Completed 1—Refused 2—Not available 3—Informant incapable 4—Other

NCCD-3-11 (D.C.)
REV. 3-69

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE—PUBLIC HEALTH SERVICE
DIVISION OF CHRONIC DISEASE PROGRAMS—NUTRITION PROGRAM
4040 NORTH FAIRFAX DRIVE, ARLINGTON, VIRGINIA, 22203

U.S. GOVERNMENT PRINTING OFFICE : 1969 OF—330-688

LISTS OF FRUITS AND VEGETABLES USED WITH HOUSEHOLD DIETARY FREQUENCY (FORM NNS-XI)

Question 11a. Fruits and Vegetables which contain 35 mg or more of vitamin C per average serving (1/2 cup).

Fruits

- Cantaloupe
- Grapefruit Juice
- Orange
- Orange Juice

- Strawberries (Fresh)
- Tangerine

Vegetables

- Broccoli
- Brussels Sprouts
- Cauliflower
- Greens (Collards, Turnip, Kale, Mustard)
- Tomatoes
- Tomato Juice
- Sweet Potato

Question 11b. Vegetables which contain 2500 I.U. or more of vitamin A per average serving (1/2 cup).

- Broccoli
- Cantaloupe
- Carrots
- Greens (Collards, Kale, Mustard, Spinach, Turnip)
- Pumpkin
- Sweet Pepper
- Sweet Potato
- Winter Squash (Acorn, Hubbard, Butternut)

GENERAL HOUSEHOLD INFORMATION, NORTH CAROLINA NUTRITION SURVEY FORM (NC-IIA)

FORM II. A

NORTH CAROLINA NUTRITION SURVEY
Dietary - Household - General Information

A. Identification Code

State(1-2) 5 6
County(3-5) ☐☐☐
E.D.(6-7) ☐☐
Household No.(8-9) ☐☐
Family(10) ☐
Line No. (11-12) 8 8
Dietary (13) ☐

RACE: (Obtain by observation)
(Circle appropriate code)
1.Caucasion
2.American Indian
3.Negro
4.Oriental

☐ 1. Is public sewer or water present in the road serving this dwelling?
1.Both sewer and water 3.Water only
2.Sewer only 4.Neither

☐ 2. Does this housing unit have water piped in?
1.Cold water only 2.Hot and cold water 3.Neither

☐ 3. What is the total number of rooms?(not counting baths or unlived-in attic or cellar)(record number)

☐ 4. How many rooms are used for sleeping?

☐ 5. Do you have a refrigerator or other means of keeping food cold?
1. No 2. Yes

☐ 6. Do you have a freezer?
1. No 2. Yes

☐ 7. What kind of facilities do you have for cooking your family's meals?
1.Hot plate 4.Electric range
2.Wood stove 5.Gas range
3.Coal stove 6.None
7.Any Combination

☐ 8. Does your stove or range have an oven which works?
1. No 2. Yes

☐ 9. (If this is a donated commodity county)
Are you now getting surplus foods?
1. No 3. Occasionally
2. Regularly 8. Not applicable

☐ If no: Did you ever?
1. No 2. Yes 8. Not applicable

☐ 10. (If this is a food stamp county)
Do you now purchase food stamps?
1. No 3. Occasionally
2. Regularly 8. Not applicable

☐ 11. How much do you pay for them monthly?
(Enter to nearest dollar)
0 Not purchased 8 Not applicable 9 Don't know

☐ 12. What is their value? (Enter to nearest dollar)
8 Not applicable 9 Don't know

13. What is the occupation of the head of this house?________________________

☐ 14. Are you employed in addition to your duties as homemaker?
1. No 2. Yes
If yes, what is your occupation?____________

☐ 15. Which group on this card is most like your family's total income?

NUTRITION KNOWLEDGE OF HOMEMAKER, NORTH CAROLINA NUTRITION SURVEY FORM (NC-IVA)

FORM: IV. A. NUTRITION KNOWLEDGE OF HOMEMAKER

INTRODUCTIONS: "I am going to read some statements about food. Please tell me whether you agree or disagree with each one. I will read the statement and if you would like me to read it a second time, I will do so.

TOTAL SCORE: ☐

Score

☐ 1. (Show pictures - group 1). These pictures show foods that an adult (grown person) ate in one day.
a. Look at these foods and tell me if that person ate all he needed for good health in one day.

☐ Agree ☐ Disagree (go on to part "b") ☐ Not sure (0) (go on to part "b")

b. If no, what is missing?

☐ a. Vegetables and fruits(1)

☐ b. Milk (1)

☐ c. Any other answer (0)

☐ 2. Milk has everything children need in order to grow and be healthy.

☐ Agree (0) ☐ Disagree (1) ☐ Not sure (0)

☐ 3. a. (Show pictures - group 3) Here are pictures of two food groups. Each picture is one kind of food. Would you place this picture of fat back in one of these food groups?
b. If yes, in which group would you place it?

☐ Meat (0) ☐ Fat (1)

☐ 4. A 45-year old man needs more food than a 16 year old boy?

☐ Agree (0) ☐ Disagree (1) ☐ Not sure (0)

A. Identification Codes

State(1-2)	County(3-5)	E.D.(6-7)	Dietary Code(13)
5 6	☐☐☐	☐☐	☐

Household No.(8-9)	Family(10)	Line No.(11-12)
☐☐	☐	☐☐

☐ 5. If every day a healthy individual eats the right amounts of meat, milk, fruit, vegetables and bread, it is not necessary to take vitamin and mineral pills.

☐ Agree (1) ☐ Disagree (0) ☐ Not sure (0)

☐ 6. Growing children need to eat milk, cheeses and other dairy products but adults do not need to eat these.

☐ Agree (0) ☐ Disagree (1) ☐ Not sure (0)

☐ 7. Throwing away cooking water from vegetables is throwing away food value.

☐ Agree (1) ☐ Disagree (0) ☐ Not sure (0)

☐ 8. (Show pictures - group 8.) These pictures show you some food groups. Each group is a different kind of food.
a. Do the pictures show all food groups you need for good health?

☐ Agree(0) ☐ Disagree (0) ☐ Not sure(0) (go on to part "b")

b. What is not shown?

☐ Meat (1) ☐ No meat except bacon and fat back(0) ☐ Any other answer (0)

☐ 9. How many servings (½ cup) of fruits and vegetables does a person need to eat a day?
☐ 4 Or more (1) ☐ Less than 4 (0)

DESCRIPTION OF PICTURES USED WITH NUTRITION KNOWLEDGE TEST (Form IVA)

Question 1.

Picture 1.	Egg and bacon biscuit black coffee
Picture 2.	Hamburger pattie on a slice of bread banana, iced tea
Picture 3.	Roast chicken, boiled potato slice of bread, frosted cup cake iced tea

Question 3.

Picture 1.	Fat back
Picture 2.	Various fats including butter, margarine, lard, bacon, hydrogenated fat, whipping cream, cream cheese, mayonnaise, salad dressing and oil
Picture 3.	Meat group including animal protein

Question 8.

Pictures of food groups - milk, fruits and vegetables, bread and cereals, and fats (the same combination of fats as in Question 3).

ANTHROPOMETRY/BLOOD WORK, NORTH CAROLINA NUTRITION SURVEY FORM (NC-IIIA)

FORM III. A. NORTH CAROLINA NUTRITION SURVEY
Anthropometry/Blood Work 2/2/70

Family Name

Phone

Last First

Address

(Place directions to home on back)

Permit Rec'd: Yes__ No__
Blood (Date)(a.m., p.m.)
Appt:
Blood
Taken:
(Staple permission slip to this form.)

#7, #11 - Percentile leave blank

A. Identification Code
State(1-2) ☐☐
County(3-5) ☐☐☐
E.D.(6-7) ☐☐
Household No.(8-9) ☐☐
Family(10) ☐
Dietary(13) ☐

#12 Selective Medical History(code)
Does or did child have congenital defects?
Code:
0-None
2-Mental retardation
3-Gastrointestinal
4-Kidneys
5-Insignificant defects
Does child have:(read these aloud)
Code:
6-Diabetes
7-Cystic fibrosis
8-Celiac Syndrome
9-Hemophilia
10-Sickle cell anemia
11-Any combination

#13 How many colds has child had in past 6 mo.?
Code: 0-None; code direct; 7 or more as 7

#14 Now: Does he have a cold now?
Code: 1-No 2-Yes

#15 How many times has child had diarrhea in last 6 mo.?
Code: 0-None; code direct; 7 or more as 7

#16 Now: Does he have diarrhea now?
Code: 1-No 2-Yes

#17 Has the child been seriously ill in the past 6 months?
Code: 1-No 2-Yes

#18 Pica: Does child eat any of these?
Code:
0-None
1-Dirt or clay
2-Starch
3-Paint
4-Other
5-Combination

B.

Line No.	LAST NAME	FIRST NAME	BIRTH WEIGHT			WEIGHT		CLO. EST. kg	NUDE WGT. kg	HEIGHT		MED. HIS.	COLDS		DIARR.		ILL	PICA	HCT.	HG.	MCHC
			lb	oz	kg	kg	%			mm	%		#	now	#	now			%	gm	
1	2	3	4		5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21

SEGMENT:

INTERVIEWER:
Col. 1, 2, 3, 4, 5, 6, 12

FIELD TECH:
Col. 6, 8, 9, 10, 12, 13, 14, 15, 16, 17, 18, 19

LAB. TECH:
Col. 20, 21

AUTHORIZATION FOR SKIN PUNCTURE, NORTH CAROLINA NUTRITION SURVEY FORM (NC-IIIB)

Form III. B. NORTH CAROLINA NUTRITION SURVEY

State (1-2)	County (3-5)	E.D. (6-7)	Household (8-9)	Family (10)	Subject line (11-12)	Dietary (13)
5 6					8 8	

AUTHORIZATION FOR SKIN PUNCTURE

This is to authorize necessary procedures to puncture the skin for purposes of obtaining a small quantity of blood from:

Line No.	Last Name	First Name	Street or Route:	City or town:

It is understood that this examination is being performed as a public health service to determine possible existence of anemia and is limited to the purposes stated.

Date: ______________________

____
Parent, guardian, or other legal representative

Witness: ______________________

____
Title

EXPLANATION

The North Carolina Attorney General has stated that it is necessary for a parent, guardian, next of kin, or adult in a similar capacity, to authorize and approve any procedure which would require the puncture of the skin of a minor. A minor, for this purpose, is any individual who is less than twenty-one years of age, unless such individual is married, which would require the consent of the spouse.

Should the parent or guardian be unable to write, the signature of such person may be affixed, indicated by his or her mark (X).

This form has been designed to make certain that essential approval has been obtained of persons in parental authority. The signed document shall be retained as a matter of record.

Completion code (75) ☐ Interviewer's (76-77) name and No. ☐☐

2/2/70

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